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This Journal is PEER REVIEWED and is indexed in: BIOSIS Previews, Current Contents/Clinical Medicine, EMBASE, PubMed/MDLINE, Science Citation Index Expanded (SciSearch), Scopus

Impact Factor: 1.370

Published by - Edizioni Minerva Medica - Corso Bramante 83-85 - I-10126 Torino (Italy) - Tel. +39 011 678282 - Fax +39 011 674502

Web Site: www.minervamedica.it Editorial Office: journalsdept@minervamedica.it - Subscriptions: subscriptionsdept@minervamedica.it

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Chief Editor address: Prof. Andrew Nicolaides, Vascular Screening and Diagnostic Centre, London, UK - E-mail: anicolaides1@gmail.com

Annual subscriptions:

Italian: Individual: Online € 130.00, Print € 135.00, Print+Online € 140.00; Institutional: Print € 190.00, Online (Small € 375.00, Medium € 441.00, Large € 460.00), Print+Online (Small € 393.00, Medium € 455.00, Large € 478.00).

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Outside the European Union: Individual: Online: € 250.00, Print € 260.00, Print+Online € 270.00; Institutional: Print € 345.00, Online (Small € 404.00, Medium € 473.00, Large € 485.00), Print+Online (Small € 427.00, Medium € 496.00, Large € 508.00).

Subscriptions: Payment to be made in Italy: a) by check; b) by bank transfer to: Edizioni Minerva Medica, INTESA SANPAOLO Branch no. 18 Torino. IBAN: IT45 K030 6909 2191 0000 0002 917; BIC: BCITITMM c) by credit card Diners Club International, Master Card, Visa, American Express. Foreign countries: a) by check; b) by bank transfer to: Edizioni Minerva Medica, INTESA SANPAOLO Branch no. 15 Torino, IBAN: IT45 K030 6909 2191 0000 0029 191; BIC: BCITITMM c) by credit card Diners Club International, Master Card, Visa, American Express.

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XVIII UIP World Congress
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PELVIC OVARIAN AND VULVAR VEINS

Does left ovarian vein reflux cause a pseudo-nutcracker effect creating mesoaortic narrowing of the left renal vein?

Judy Holdstock, Angie White, David Beckett, Tim Fernandez-Hart, Jaya Nemchand, Mark Whiteley
The Whiteley Clinic, Guildford, United Kingdom

Background: In June 2016 we introduced trans-abdominal duplex ultrasound (TADUS) to evaluate the left renal vein (LRV) alongside transvaginal duplex ultrasound (TVDUS) for pelvic venous reflux. LRV diameters pre and post pelvic vein embolization (PVE) were evaluated.

Methods: 17 female patients (age 26-56, mean 43) had diagnostic TVDUS and TADUS prior to PVE and 6 weeks after. 2 patients with pelvic congestion syndrome (PCS), 10 with leg varices and PCS, 7 with leg symptoms only. 2 groups were analysed.

Group 1, 10/17 patients exhibited entire left ovarian vein (LOV) reflux. Group 2, 5/17 patients with no LOV reflux plus 2/17 patients exhibiting distal LOV reflux only.

TADUS performed with patients erect and 30° recumbent to examine LRV 2 & 3.

Pre/post PVE AP diameters of the hilar and mesoaortic LRV and ratios were recorded.

Results: Group 1: 9 patients with LOV reflux had pre PVE hilar to mesoaortic diameter ratios with a mean of 4.8 and post PVE ratios with a mean 2.2 (P=0.009)

Group 2: 7 patients, 5 without LOV reflux and 2 with LOV reflux distally had pre PVE ratios with a mean of 1.9 and post PVE mean ratio of 1.6 (P=0.667)

Conclusions: Nutcracker phenomena has been suggested as the cause of LOV reflux. This study demonstrates LOV reflux causes a syphonic effect with flow from the LRV draining into the pelvis in the erect position. This results in physiological narrowing of the mesoaortic LRV. This effect is relieved following PVE of the LOV.

Analysis of a retrospective pelvic embolization audit for the evaluation of post embolization symptoms

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Background: Pelvic Congestion syndrome (PCS) is associated with pelvic venous reflux (PVR) in many cases. Pelvic vein embolization (PVE) is the established safe and effective method of treatment for PVR. Patients from our unit have reported flu-like symptoms post embolization. However, there is no data in the literature to support this phenomenon. This study aims to report on the analysis of the pattern of post treatment symptoms experienced by patients.

Methods: A retrospective audit of post embolization symptoms was conducted. Patients were diagnosed with PVR using transvaginal duplex ultrasound and were treated with transjugular PVE. Patients seen in our unit between April 2014 and October 2016, N.=117, were sent a questionnaire to evaluate symptoms with focus on three specific areas: pain, presence of flu-like symptoms and impact on quality of life.

Results: Thirty-five patients aged 33-77 years responded to the questionnaire (response rate 29.9%). At a mean follow-up of 15 months (±7), 82.9% of patients were pain free. Flu-like symptoms were experienced by 28.5% after embolization (N.=33), and two thirds of these patients stated symptoms were limited to 1 to 2 days. The inability to continue daily activities affected 90% of patients with flu-like symptoms.

Conclusions: PVE is an effective treatment for PVR and is in line with results from other studies. Preliminary results suggest that flu-like symptoms manifested post embolization are not unusual and can impact patients’ quality of life. Further work is required before significance can be determined.

To assess reflux patterns and the results of endovascular obliteration of ovarian veins in patients with symptomatic pelvic venous incompetence (PVI)

Devendra Dekiwadia
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Background: To assess reflux patterns and the results of endovascular obliteration of ovarian veins in patients with symptomatic pelvic venous incompetence (PVI).

Methods: A total of 71 female patients (mean age 49 years) with signs of PVI on selective phlebography of the pelvic veins were included in the study. In 53 cases (75%), recurrent varicose veins following previous surgery and stripping of the great saphenous vein were present and 51 patients (72%) were multiparous (≥2 children). Symptoms were scored on a visual analogue scale (VAS) assessing pelvic and lower limb pain. After duplex ultrasonography of the lower limb veins, in cases of suspected PVI, the presence of any reflux in the ovarian and pelvic veins was demonstrated by phlebography. In selected cases, endovascular treatment with embolization was used. Follow-up assessment of symptoms was carried out at 1, 2 and 3 years.

Results: The left ovarian vein (OV) and the right internal iliac vein (IIV) were most frequently affected by reflux (N.=41, 58% each). In about half the number of patients, reflux was demonstrated in more than one main pelvic veins (N.=38, 54%). An extension of reflux into varicose veins of the groin or lower limb was demonstrated in 44 patients (62%); Improved symptoms were detected in patients with isolated IIV incompetence, who underwent embolization treatment although this did not reach statistical significance. Conservative treatment of patients with isolated IIV incompetence resulted in no relevant changes. Worsening of symptoms was found in patients with combined reflux who underwent conservative treatment. In case of combined OV and IIV reflux, isolated interventional treatment of incompetent ovarian veins did not improve symptoms at each interval of the follow-up, while coiling of all reflux
pathways resulted in symptom reduction; but this did not reach statistical significance due to the small numbers of patients.

Conclusions: Combined reflux in more than one pelvic vein is common. In these cases, isolated treatment of ovarian veins or conservative treatment is associated with a poor midterm clinical outcome. A clinical improvement was achieved only in patients with isolated ovarian vein incompetence.

Iliac vein stenting can reverse incompetence in patients with pelvic congestion syndrome
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Background: Pelvic congestion syndrome (PCS) is widely thought to be due to gonadal or internal iliac vein reflux or compression syndromes of the iliac or renal veins such as May-Thurner. We evaluated the treatment response following iliac vein stenting alone in a group of women presenting with severe iliac stenosis, with or without concomitant renal vein compression or gonadal reflux.

Methods: Between June 2016 & July 2017 patients with symptoms of PCS severely affecting their Quality of Life (QOL) were evaluated with transabdominal ultrasound (TAU) and results confirmed on venography. 61 patients were then treated for severe venous outflow obstruction with ilio-caval stenting. Patients were closely followed-up with TAU, clinical assessment and QOL assessment tools.

Results: TAU suggested moderate to severe stenosis in 61 patients. Follow-up venography confirmed outflow obstruction with pelvic collateral and severe stagnation of contrast in all patients. 27 of these patients had previous had gonadal or iliac vein reflux on ultrasound. 27 of these patients had previous had gonadal or iliac vein reflux on ultrasound. 30 patients had complete resolution of pelvic pain, 7 patients had decrease in dyspareunia & 16 had concomitant renal vein compression on duplex. At follow-up 32 patients had complete resolution of pelvic pain, 7 patients had decreased dyspareunia & 13 had resolution of other symptoms such as buttock pain, lower back pain, bloating & appearance of varicose veins. Of the 52 patients who experienced left lower extremity pain or discomfort, 46 had complete resolution after treatment with 30% showing objective improvement of the oedema. Follow-up TAU found all stents to be widely patent. 16 patients have had reversal of incompetence with more expected as we continue with follow-up assessments. No patient required embolization.

Note: The numbers in this study are yet to be finalized as some patients are still to undergo F/U assessment.

Conclusions: Iliac-occlusion is an underdiagnosed and under-treated cause of PCS. Venous angioplasty and stenting provides excellent results, with resolution of chronic pelvic pain, dyspareunia & in some cases even resolution of incompetence. It should be considered as the primary treatment for this pathology even in the presence of concomitant gonadal incompetence of renal vein compression.

New gold standard for investigation of pelvic vein reflux

Background: In September 2016, trans-abdominal duplex ultrasound (TADUS), trans-vaginal duplex ultrasound (TVDUS) and trans-labial duplex ultrasound (TLDUS) was introduced as a new gold standard for investigation of pelvic vein reflux. 141 female patients underwent this new protocol and their reflux patterns were analysed.

Methods: TADUS performed with patients erect and 30° to examine left renal vein (LRV), iliac veins and proximal ovarian veins, and TVDUS to assess right and left distal ovarian veins (ROV/LOV) and internal iliac veins (RIIV/LIIV) in three groups with the following presentations: Group 1: 28/141 pelvic congestion syndrome, Group 2: 6/141 symptomatic labial varicosities.Group 3: 107/141 leg varicose veins with pelvic communication. 60/107 displayed pelvic symptoms.


Conclusions: This new protocol proves effective in evaluation of reflux territories and severity. It demonstrates low levels of confirmed LRV nutcracker and May-Thurner compared to physiological reflux as the major cause of pelvic vein symptoms in all three groups.

Complications after pelvic vein embolization for the treatment of pelvic congestion syndrome
Zaza Lazarashvili
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Background: Pelvic congestion syndrome, which is one of the important cause of chronic pelvic pain, occurs 6-11% of women in reproductive age. Pelvic vein embolization is the method of choice for the treatment of this condition. Complication rate is important criteria for assessment of effectiveness of each treatment option. The aim of current study was evaluation of complications after pelvic vein embolization in population with primary pelvic vein dilatation.

Methods: Retrospectively was analysed data of 134 patients to whom were done pelvic vein embolization. The mean age was 27.6 (18 – 47) year. Embolization were provided from brachial or femoral access. As an embolization material was used sclerosing foam and mechanical embolization devices (pushable or detachable coils, occluders). Follow-up period was 60 months.

Results: Pelvic vein embolization completely was done in 133 cases (99,2%). Only in one case with congenital looping of left gonadal vein it was impossible to provide embolization. The main complications were: access site superficial haematoma – 4 cases, thrombosis of cephalic vein – 2 cases. Postembolization syndrome was manifested in 16 (11,9%) cases. No vein perforation, coil migration, cardiac arrythmias or allergic reactions were detected.

Conclusions: Pelvic vein embolization for the treatment of pelvic congestion syndrome is characterized with high efficiency and low rate of complications.

Duplex ultrasound imaging in pelvic venous reflux disease and lessons learned about nut-cracker and “Pseudo-nut-cracker” syndrome - Working group diagnosis and treatment of pelvic congestion syndrome
Mark Whiteley1, 2, Judy Holdstock2, David Beckett2
1Working Group Diagnosis and Treatment of Pelvic Congestion Syndrome, UIP, Melbourne, Australia; 2The Whiteley Clinic, Guildford, United Kingdom
Background: Pelvic congestion syndrome (PCS) has a strong association with pelvic venous reflux (PVR) and pelvic venous obstruction (PVO). Currently, several imaging modalities are used in the diagnosis of PCS but none are perfect. This presentation looks at the role of duplex ultrasound in the diagnosis of PCS and reports new findings of “pseudo-nutcracker” syndrome.

Methods: Transvaginal duplex ultrasound scanning (TVUS) using the Holdstock Protocol has been our method of diagnosing PVR since 2000. We have compared TVUS to venography, ovarian vein diameter and clinical outcomes after embolization. We have now added transabdominal duplex ultrasound (TAUS) to our protocol, looking for May-Thurner syndrome (MTS), Non-Thrombotic Iliac Vein Lesions (NIVL) and Nut-Cracker syndrome (NCS).

Results: We have shown that diagnosis of PVR by TVUS correlates better with outcomes better than venography. Also, we have shown there is no correlation between ovarian vein diameter and reflux – nullifying any imaging technique using vein diameter. The addition of TAUS has allowed us to look for PVO. David Beckett has noted that scans suggesting nut-cracker syndrome pre-embolization (>5 fold narrowing of the left renal vein and left ovarian vein reflux) can resolve after embolization of the left ovarian vein – suggesting the ovarian vein reflux is a sump causing the appearance rather than a high-pressure bypass of a stenosis. This has been confirmed by Judy Holdstock.

Conclusions: TVUS using the Holdstock Protocol with TAUS appears to be the current gold-standard for imaging PCS. “Pseudo-Nutcracker syndrome” is described where the appearance of NCS disappears after embolization of the reflux.

Patterns of pelvic venous duplex findings in patients who present with varicose veins
David Huber
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Three hundred and thirteen patients with varicose veins, who presented for duplex ultrasound, had an abdominal and pelvic duplex scan. The aim was to assess the patterns of venous findings including iliac venous compression, left renal vein compression, ovarian vein incompetence and internal iliac vein incompetence. The age distribution, incidence and relationship between findings will be discussed.

Treatment with foam sclerotherapy: advantages and limits in pelvic, ovarian and vulvar veins
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Background: Pelvic congestion syndrome is a recently recognized clinical problem due to pelvic vein insufficiency. Sometimes, propagation of venous reflux into the lower extremities causes varicose veins and chronic venous disease (CVD).

The present author proposes a different approach to the treatment of these points of reflux, above all with regard to point P, through the injection of sclerosant foam with colour-duplex ultrasound guide.

Methods: 647 consecutive women patients, affected by CVD of the lower limbs, underwent both clinical and colour duplex investigation, demonstrating in 95 women (age 32-66 years) venous reflux from the vein of the Alcock channel. They underwent one session of ultrasound guided foam sclerotherapy, followed in 22 cases, by a second stage injection after 3 weeks. Follow-up includes clinical as well as ultrasonographic evaluation.

Results: The average follow-up lasted 24 months. No minor nor major complications have been reported. Reflux through the Alcock channel vein as well as the connected varicose veins disappeared in the treated area entirely.

Conclusions: Our experience demonstrates that in the case of pelvic varicocoele with escape points towards the lower limbs, ultrasound guided foam sclerotherapy may represent a first choice method, thanks to its safety and efficacy which is achievable after a short learning curve. Ultrasound –guided foam sclerotherapy, in the short term, seems to be both effective and minimally invasive for treating such an atypical albeit frequent pattern of reflux in women. Further research will be necessary in order to validate this technique in the long term.
**CHRONIC VENOUS DISEASE**

**A Ca and Cb for each C class of the CEAP classification**

**Duplex ultrasound, clinical and quality of life correlates in chronic venous disease**

Sarah Onida, Maira Hameed, Roshan Booton, Tristan Lane, Amanda Shepherd, Alun Huw Davies

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**Background:** Chronic venous disease (CVD) presents an epidemiological, societal and financial burden. Clinical assessment includes Clinical, Etiological, Anatomical, Pathophysiological (CEAP) staging and measures of disease severity, such as the Venous Clinical Severity Score (VCSS). Duplex ultrasound (DUS) is the gold standard imaging tool, providing anatomical and haemodynamic information. Quality of life tools (QoL) are important in the holistic assessment of the CVD patient.

Aims: To investigate whether QoL correlates with disease severity, the relationship with the presence of reflux and vein diameter is less clear. The aims of this study were: to compare DUS data with disease-specific clinical and QoL data in CVD patients and healthy volunteers; to correlate the number of refluxing trunks and maximal vein diameter with clinical and QoL features.

**Methods:** Participants were prospectively recruited from a tertiary center (2013 – 2017) and imaged with DUS of the lower limbs, recording the number of refluxing trunks and maximal vein diameter. CEAP class, VCSS and Aberdeen Varicose Vein Questionnaire (AVVQ) results were recorded. Statistical testing was performed using SPSS™. Spearman’s correlation was employed to explore the relationship between duplex and disease specific data.

**Results:** 792 participants were recruited: 687 patients (51% female), with a mean age of 52.2 years (SD=17; range 18-96) and 105 control subjects (62% female), with mean age of 36.2 years (±12.4; range 21-88). A weak positive correlation was identified between maximal vein diameter and AVVQ (Spearman coefficient $r_s$=0.276; P=0.01), CEAP ($r_s$=0.298; P=0.01) and VCSS ($r_s$=0.344; P=0.01). Conversely, moderate correlation was identified between the number of trunks affected by venous reflux and AVVQ ($r_s$=0.428; P=0.01), CEAP ($r_s$=0.44; P=0.01) and VCSS ($r_s$=0.408; P=0.01).

**Conclusions:** A weak correlation exists between CEAP, VCSS and AVVQ and maximal vein diameter, suggesting this may have limited utility in the assessment of the patient with CVD. A moderate correlation exists between the number of trunks affected and both clinical and QoL scores, highlighting the importance of accurate DUS assessment in CVD patients.

**Clinical and quality of life characteristics of CVD patients in a metropolitan vein center**

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**Background:** Chronic venous disease (CVD) is a common condition with an important clinical and socio-economic burden. Quality of life (QoL) tools, both generic and disease-specific, have been recognized as being a key component in the assessment of the individual with CVD. The aim of this study was to explore the correlation between Clinical, Etiological, Anatomical, Pathophysiological (CEAP) class, demographics and disease specific QoL in a population of CVD patients and asymptomatic volunteers.

**Methods:** Participants were recruited from a single center (October 2014-June 2016). Individuals with clinical symptoms of CVD scheduled for intervention and asymptomatic individuals were invited to participate. Demographic data, CEAP classification, venous clinical severity scoring (VCSS) and Aberdeen varicose vein questionnaire (AVVQ) data were collected.

**Results:** 517 individuals with CVD and 105 healthy volunteers were recruited. Median age, body mass index (BMI) and parity history were differentially distributed in the two groups ($P<0.05$). CEAP distribution across the whole population was: C0-11.7%, C1-5.5%, C2-40.5%, C3-10%, C4-23%, C5-5%, C6-4.3%. Median VCSS and AVVQ values ranged from 0-16 and 0-44.6 respectively, both exhibiting statistically significant correlation with increasing CEAP class ($P<0.01$). There was a statistically significant positive correlation between AVVQ and VCSS ($P<0.01$, Spearman’s rank order correlation coefficient 0.729).

**Conclusions:** The data reveals differential demographic and clinical data in CVD vs. control groups. Disease specific QoL was found to significantly correlate with both CEAP class and disease severity scoring, highlighting the importance of QoL assessment in these patients.

**A systematic review of peripheral blood biomarkers in primary chronic venous disease**

Lara-Rose Manley, Alun Davies, Sarah Onida

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**Background:** This systematic review aimed to explore the literature on the relationship between circulating biomarkers and primary chronic venous disease, as the pathogenesis, aetiology and progression of the condition is still poorly understood.

**Methods:** A systematic literature search was conducted in MEDLINE and EMBASE using search terms pertaining to primary chronic venous disease and circulating biomarkers, including “homocysteine”, “D-dimer” and “vascular endothelial growth factor”. The inclusion criteria for identified studies included those reporting measurements of circulating biomarkers in chronic venous disease according to the Clinical Anatomical Pathophysiological (CEAP) classification system published after 1st March 1994 in English.

**Results:** Concentrations of homocysteine, D-dimer and vascular endothelial growth factor were more elevated in cases compared to controls, and increased with increasing CEAP stage. Of the three biomarkers, homocysteine was the most significantly and consistently associated with chronic venous disease. The concentration of all biomarkers was more elevated in samples from the leg compared to the arm in the same individual.

**Conclusions:** Further research into the association between biomarkers and primary chronic venous disease may provide insights into the pathogenesis of the condition, potentially enabling the stratification of vascular patients according to their risk of developing complications. However, for research in this field to progress, observational studies need to employ a more stringent quality criteria and standardized methodology. Longitudinal studies with larger sample sizes would also be beneficial in order to establish the true association between biomarkers and disease progression in primary chronic venous disease.
Calf volume reduces using intermittent thigh compression in patients and controls

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Background: Calf swelling can be reduced mechanically using compression bandages, medical compression stockings, direct intermittent pneumatic compression of the calf, elevation and by neuromuscular electrical stimulation. Using isolated thigh compression to achieve this is counter-intuitive. However, a temporary obstruction may act by opening up the venous drainage pathways thereby facilitating better outflow on relief from the obstruction. The aim was to investigate the effect of pneumatic thigh compression on calf volume.

Methods: Three groups of subjects were studied (N.=14 in each group). (i) Healthy controls without clinical evidence of venous disease. (ii) Patients with the post-thrombotic syndrome (PTS). (iii) Patients with lymphoedema confirmed by lymphoscintigraphy. A 12 cm diameter thigh-cuff (Hokanson®) was inflated to 80 mmHg until the calf no longer increased in volume. Then the cuff was deflated suddenly (VenaPulse® pump). The change in calf volume was measured using air-plethysmography (APG). The regional ethical approval number was 13/LO/0155.

Results: The thigh compression and deflation manoeuvre significantly reduced the volume of the calf in all 3 groups (Wilcoxon). Reported as median (inter-quartile range) the percentage change in calf volume was: Control 7.6 (4.2 - 9.1), P=.002; PTS 7 (4.2 - 10), P=.004; Lymphoedema 11.2 (7.3 - 16.3), P=.001. The lymphoedema group responded better statistically than the control group (P=.013, Mann-Whitney U-test).

Conclusions: A novel therapy for reducing calf swelling is proposed. However, the exact mechanism of action and the effect of more than 1 compression/relaxation cycle requires further investigation.

Risk factors for venous pain in patients with chronic venous disease: data from population-based epidemiological study

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Background: Venous pain is the important and one of the most prevalent symptoms of chronic venous disease (CVD). Meanwhile, many patients don’t report they experienced venous pain having had the disease for a long time and/or suffered from severe CVD. The aim was to find the risk factors for developing of venous pain.

Methods: Data were obtained from cross-sectional study on the CVD prevalence in Kryukovo rural community in Central Russia. Patients were examined clinically and by duplex ultrasound. Demographical data, family history, medical history of the patient, signs and symptoms of CVD were recorded. For describing patients we used CEAP classification. For defining venous pain we used the latest recommendation of international consensuses. Multivariate logistic regression with venous pain as an outcome variable was performed. Odds ratios (OR) with 95% confidence intervals (CI) were calculated.

Results: Among 783 subjects of >10 years (mean age 49.3) we found CVD in 484 (61.8%). The prevalence of venous pain was 14.7% in CVD patients. The logistic regression revealed as a significant independent risk factors for venous pain female gender (OR 2.093, 95% CI 0.929-4.176, P<.01), age (OR 1.021, 95% CI 0.997-1.046, P<.01), presence of venous edema (OR 4.184, 95% CI 0.946-18.500, P<.01), rough labour (OR 3.240, 95% CI 1.598-6.573, P<.001).

Conclusions: Female gender, age, presence of venous edema, rough labour were confirmed as independent risk factors for venous pain in patients with CVD.

Quantifying superficial venous insufficiency by comparing four hemodynamic tests

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Background: Reflux measurements are qualitative. Quantitative measurements of superficial venous insufficiency (SVI) include the venous arterial flow index (VAFI), the saphenous recirculation index (RCI), the venous filling index (VFI) and the postural diameter change (PDC) of the saphenous trunk. The objective was to investigate their relationship.

Methods: Four haemodynamic parameters were measured in 21 legs from 16 subjects. Legs were divided into Group A (no reflux, N.=7) and group B (reflux, N.=14). The VAFI is the ratio of the common femoral vein volume flow divided by the common femoral artery volume flow. The RCI is the ratio of reflux volume over antegrade volume after calf compression. The VFI is the rate of calf volume increase on dependency measured in mL/s, using air-plethysmography. The PDC is the percentage reduction of the saphenous trunk diameter from standing to lying.

Results: The clinical part of the CEAP classification was: C0=3, C1=4, C2=5, C3=1, C4=6, C5=1. All 4 tests demonstrated significant differences between the 2 groups with minimal overlap (Mann-Whitney U-test): VAFI (P=.028), RCI (P=.0005), VFI (P=.001) and PDC (P=.014). Furthermore, significant correlations were observed with the tests: VAFI vs. RCI (r=.532, P=.015), VFI (r=.489, P=.025) and PDC (r=.474, P=.030). RCI vs. VFI (r=.446, P=.043) and PDC (r=.527, P=.014).

Conclusions: Superficial venous insufficiency can be quantified using the VAFI, RCI, VFI and PDC. However, understanding why there are significant relationships among these parameters requires further work.
SCLEROTHERAPY

Ultrasound guided foam sclerotherapy of the small saphenous vein: long term results
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Background: In a prospective trial we analysed the long term results of ultrasound guided sclerotherapy (UGFS) in case of small saphenous vein (SSV) insufficiency.

Methods: 100 consecutive pts with 104 effected limbs were included (mean follow-up 48 months). A single injection of foam (1-3% polidocanol), 1 to 5 ml (mean 2.61 ml), was given under ultrasound guidance. Retreatments were allowed and documented. Clinical and duplex controls were done after 1 week, after 6, 12, 24, 36, 48 and 60 months.

Results: Including retreatments we achieved a complete SSV occlusion after 1 month in 90%, after 6 month in 76%, after 12 month in 79%, after 24 month in 83%, after 36 month in 74, after 48 month 67,4% and after 60 month in 70%.

Conclusions: Under the condition of regular controls with retreatments if needed UGFS of SSV leads to high rates of complete occlusion. Because of its high cost effectiveness, high patient’s satisfaction and low morbidity UGFS should be considered as standard procedure in case of SSV insufficiency.

Foam prepared with pure oxygen decrease adverse effects in sclerotherapy
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Background: Sclerotherapy with Polidocanol Foam prepared with oxygen instead room air causes some adverse effects that can become dangerous, we seek to avoid or decrease the presence of these undesirable effects by preparing the foam with pure oxygen.

Methods: The study was approved by the ethics committee and informed consent of the patients. The sclerotherapy was made with polidocanol Foam prepared with the gas-liquid proportion of Tessari’s method: Two groups were formed, one was treated with polidocanol-room air foam and another with polidocanol-oxygen foam, which used pure oxygen instead room air. No special exclusion criteria between groups.

Results: Patients=1240, Legs=1560. Adverse effects:Cough (0.13% O2, 3.7% RA), Dizziness (0.06%O2, 2.1% RA), Visual disturbances (0.0%O2, 1.4%RA), Back pain(0.0%O2, 0.7% RA), Hypotension(0.0%O2, 0.5%RA), Migraine (0.0%, 0.2%RA). The effectiveness of treatment was the same in both groups, the Foam prepared with oxygen had better performance. A patient did severe Migrain episode with RA Foam, she before treated with liquid sclerosant without problem.

Conclusions: Foam sclerotherapy performed with Oxygen is a good option to prevent and reduce adverse effects of polidocanol. Our theory is that O2 bubbles allow gas to diffuse into the brain, the nitrogen on the other hand is not a physiological gas and creates anoxic zones which produce neurological symptoms. This does not have anything to do with endothelin. In the patient with migraine the proof would be sclerosing with Fom of polidocanol and oxygen and hope no migraine episode.

New photoplethysmographic outflow test (PPG-outflow test) - Value for safe sclerotherapy of varicose veins (a pilot study)
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Background: In early 1980s photoplethysmography (PPG) become an integral part of vascular diagnostics. Progressive technical development of this method (digitization), quantification and standardization of different venous tests brought new possibilities of exact evaluation of venous function before, during and after sclerotherapy, as well as in venous surgery or endovenous procedures. The goal of our pilot study was to develop a simple PPG test for early identification of venodynamic changes (venous spasm). Detected abnormalities of venous outflow are considered a warning signal for a possible development of deep venous thrombosis (DVT) as a complication after sclerotherapy in calf region.

Methods: Visible venous spasm is an immediate phenomenon after sclerotherapy in superficial veins (particularly when using foam). This spasm is a temporary condition and disappears in seconds. However, if such spasm propagates into larger intramuscular and deep veins of a calf, it lasts longer and could be viewed as a warning signal for potential development of DVT.

In the first phase of our study (using the AngE Phlebo PPG - Sonotech, Austria) we tried to evaluate normal venous outflow during passive elevation test and compare it with the outflow values when simulating conditions during DVT(tourniquet test). In each of 150 measurements we observed decreased venous outflow from the calf region.

In the second phase of the study, we performed this test after 459 foam sclerotherapy treatments in the calf region. We found 21… pathological“ PPG outflow curves.

This study has an Ethics Approval from local Czech authorities.

Results: All patients included in this study were examined using DUS 3 and 7 days after the treatment and we identified 3 cases of thrombi propagation into the deep venous system on day 3 and another 5 on day 7. All of them were among those with… pathological“ PPG-Outflow test. After 10 days of LMWH application and compression, the Duplex scan showed normal results in all patients. No pulmonary embolism was observed.

Conclusions: While our preliminary results seem to be promising, we are aware, that a wide multicentric study is necessary for implementation of this new test to daily sclerotherapy practice.

Diminishing of blood content in the vein before sclerotherapy (without perivenous tumescent infiltration)
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Background: It is known that blood dilutes and neutralizes sclerosing agent. Several measures were taken to diminish blood content in the vein and their efficacy was evaluated by ultrasound and laboratory analysis.

Methods: 18 patients with great saphenous vein (GSV) insufficiency participated in the study. The thigh segment (~6,5 cm) was tested. Two or three cannulas were inserted. The glucose concentration was measured in the vein immediately before and then 5 resp. 15 seconds after completing the following steps: 1. leg elevation 30°; 2. compression of
**GSV at knee level; 3. instillation of sclerosing agent to induce spasm; 4. flushing of the vein with physiological saline. The presence of spasm was evaluated by ultrasound between steps 3 and 4 (only qualitatively).**

**Results:** Spasm was achieved in all of the 33 evaluated segments. 49 blood samples were analysed. The median drop in glucose concentration in the second and third cannulas was 62% and 66% respectively in the early phase (after 5 sec.). The effect was not significantly different in the next 10 seconds. 17 samples could not be analysed because it was not possible to collect a sufficient amount of blood from the vein.

**Conclusions:** With a combination of several simple measures it is possible to diminish the blood content in the vein, whereby the effect lasts long enough to perform sclerotherapy. It is not yet known if it can reduce the recanalization rate.

**Results of ultrasound-guided foam sclerotherapy for incompetent great saphenous vein without additional foam injections for varicose tributary veins: mid-term results**

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**Background:** A five-year follow-up study was carried out to evaluate the feasibility, efficacy and safety of the ultrasound-guided foam sclerotherapy (UGFS) for incompetent great saphenous vein (GSV) without additional foam injections for varicose tributary veins.

**Methods:** Consecutive patients with 88 limbs out of 86 patients who had GSV incompetence were enrolled. All patients were placed supine and received ultrasound-guided foam sclerotherapy for refluxing great saphenous vein (GSV) using 3% polidocanol (POL)-foam with their affected leg elevated 30 degrees. Each visible varicose tributary vein was not injected. UGFS was the sole treatment modality used in all cases, and repeat UGFS was performed where indicated following serial follow-up ultrasound.

**Results:** During UGFS, successful needle placement and ultrasound-monitored foam injection was accomplished in all cases without complication. After the injection, qualitative ultrasonographic inspection of the foam demonstrated intense and diffuse vasospasm both proximally and distally, including varicose tributary veins. Complete varosasm in the GSV was found in 81% of the treated limbs. No immediate and late complications that can be associated with UGFS, including migraine, dizziness, visual disturbance and venous thromboembolism, were found in this series. Kaplan-Meier life table analysis showed primary success in five years in 66% and secondary success after further treatment of recurrence by UGFS in 89%. Most recurrent varicose veins were considered due to GSV recanalization via competent tributary veins.

**Conclusions:** UGFS for incompetent GSV without additional foam injections for varicose tributary veins shows relative good mid-term results without any complications. However, there are still rooms for improvement in the rates of immediate vasospasm and the mid-term success by controlling competent tributary veins.

**Small diameter recanalization of the great saphenous vein after ultrasound-guided sclerotherapy: one and two-year follow-ups**

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**Background:** Duplex ultrasound examination performed on patients previously treated for great saphenous vein (GSV) incompetence using ultrasound-guided foam sclerotherapy (UGFS) may identify small-diameter recanalizations. What are their significance and outcome? The objective was to assess the anatomical outcome of small-diameter (≤3 mm) above-knee GSV recanalization

**Methods:** Patients treated by UGFS for GSV incompetence (from 1 to 10 years) and presenting a recanalization of the GSV trunk with a diameter ≤3 mm were enrolled in a prospective study. The primary outcome was the diameter of the recanalized GSV trunk (15 cm below the SFJ). The secondary outcome was the identification of factors that might affect GSV recanalization.

**Results:** Inclusion. 110 patients treated 4.1±2.6 years ago

C1: 71%: Asymptomatic Average VCSS: 1.6±1.3

Average diameter: 1.9±0.5 mm

**One-year follow-up.** Variation of the diameter from the inclusion:

Average diameter: 1.9±0.6 mm P=0.04

Reduced/identical: 63%

Increased 0.1-0.5 mm: 24%

Increased >0.5 mm: 13%

**Two-year follow-up.** From the inclusion:

Average diameter 2.1±0.8 mm P=0.01

Reduced/identical: 52%

Increased 0.1-0.5 mm: 30%

Increased >0.5 mm: 18%
No risk factors for progression were identified. No clinical changes were reported.

**Conclusions:** It is common to observe small-diameter recanalizations of the GSV trunk in patients who had been treated by UGFS several years previously. Most of them are C1 and asymptomatic patients. At one and two-year follow-ups, no increase of the recanalization diameter was observed in more than 50% of patients. Small recanalization should not always be considered as a failure of treatment and there is a need to question the requirement for re-treating the GSV trunk once a small diameter recanalization has been identified.

**Selective catheter-directed intraoperative foam sclerotherapy**

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**Background:** Catheter directed sclerotherapy (CDS) involves the use of a long catheter to deliver a sclerosing agent into a target vessel under ultrasound guidance. CDS was developed to increase the safety and efficacy of ultrasound-guided sclerotherapy (UGS). CDS has a better safety profile when compared with UGS with virtually no risk of intra-arterial injection or sclerosant extravasation. CDS combined with using perineural tumescent local anesthesia has positive effective to decrease vein size and blood content. It increases the success rate of CDS. What is the selective CDS? When did I perform selective CDS? Selective CDS is injection of sclerosant only to the tangled varicose at SFJ area. 1) In the case of recurrence with neovascularization at SFJ, it’s hard to reoperation of GSV stump due to adhesion and easy bleeding of neovascularure. If it is applicable the CDS, it is easy method to close the reflux. 2) In the case of tangled varicose at SFJ, it’s hard to division and easy to rupture of thin varicose vessels during division. And it’s impossible to access SFJ by using endovenous ablation method (EVLA or RFA) or nonsurgical method like as VenaSeal. Intraoperative catheter directed sclerotherapy was performed by using 1:4 foam sclerotherapy with 1.5% sodium tetradecyl sulfate. It is important to identifying the injected sclerosant by using ultrasound monitoring. When the sclerosing agent are reaching to SFJ compress that point not to enter deep vein. I have experienced three cases. At 1 week and 6 months follow-up sonogram after procedure, confirm that there is no DVT and obstruction of varicose.

**Conclusions:** The merit of my procedure. It is easy treatment method for complex varicose veins on SFJ area where impossible to access by endovenous ablation method. After selective CDS, the accessible GSV is treated by endovenous ablation. Which reduce the amount of sclerosing agent and decrease the side effect of sclerotherapy.

**Foam sclerotherapy: state of the art**

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Foam sclerotherapy has become widely used for the treatment of varicose veins. It is also often used for the treatment of venous malformations and pelvic varices. Several different methods of treatment have been described with foam sclerotherapy. Some techniques have been rigorously evaluated and others have remained the author’s personal method. The outcome of foam sclerotherapy has been reported to have widely differing success rates. In this presentation, I review a number of strategies that have been published and compare the reported outcomes of treatment. A limited number of randomized clinical trials of foam sclerotherapy have been published, some with satisfactory outcomes for foam sclerotherapy. Others have very poor results. I analyse the reasons for success and failure of this method.
NEW TECHNOLOGIES

Biompedance spectroscopy and volumetry: short-term monitoring of lymphedema treatment

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Background: To assess with biompedance spectroscopy (BIS) and circumference-based volumetry (VOL) short-term outcomes of lymphedema (LYM) intensive complex decongestive treatment (CDT).

Methods: Cohort study on 41 patients (15 M, 26 F, mean age 51 years) affected by primary or secondary LYM stage II/III of the lower limbs. CDT (manual and electro-sound lymphatic drainage, compression bandage and dietary supplements) was applied for 6 days. At the start (D0) and end (D6) of CDT, both VOL and BIS (U-400, Impedimed®) of total limb and leg were performed. L-Dex, resistance (fluid-related parameter) and reactance (tissue-related parameter) were extrapolated from BIS raw data.

Results: Total limb and leg VOL (mean value in cm and standard deviation) was respectively at D0 11072.9 (±/−4133.8) and 3150.8 (±/−780.7), at D6 10493 (±/−3492.4) (-5.2% and P=0.0014) and 2980.2 (±/−723) (-5.4% and P<0.0001). L-Dex in the total limb was 18.9 (±/−19.7) at D0 and 14.8 (±/−16.5) (-21.5% and P<0.001) at D6. Resistance in the total limb and in the leg was respectively: at D0 200.4 (+/−44.6) and 117.5 (+/−62.7) (+18.5% and P<0.0001) and 150 (+/−49.7) (+27.7% and P<0.001). Reactance in the total limb and in the leg was respectively: at D0 237.3 (+/−51.8) (+15% and P<0.001) and 115 (+/−52.2) (+49.6% and P<0.001).

Conclusions: CDT on lymphedematous limbs was effective at short-term; both VOL and BIS data showed a statistically significant improvement with treatment. BIS proved helpful to assess fluid decrease/dislocation and tissue composition.

Randomized control trial: dosing of electrical stimulation in venous insufficiency

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Background: A pilot randomized controlled trial (RCT) proved neuromuscular electrical stimulation (NMES) improves venous flow parameters and orthostatic oedema in patients with chronic venous disease (CVD). This prospective RCT examines the effect of varying frequency with treatment. BIS proved helpful to assess fluid decrease/dislocation and tissue composition.

Methods: Patients with CEAP C3-C5 CVD were randomized to Group A (no NMES), B (30 minutes of NMES daily) or C (60 minutes of NMES daily). Femoral vein flow parameters (time averaged mean velocity, TAMV and volume flow, VF) were measured using duplex ultrasound. Limb volumes before and after treatment were measured at week 0 and 6 using an optoelectric volumeter. Quality of life (QoL) was compared using validated questionnaires at baseline and 6 weeks.

Results: Seventy-six patients were allocated to groups A, B and C at equal ratios. Six patients were lost to follow-up. There was a significant difference between the groups in percentage change in TAMV (Group A +3.36%, B +26.58%, C +39.49%, P=0.0001) and VF (Group A +5.53%, B +28.81%, C +52.82%,P=0.0003) whilst using the device compared to rest. Limb volume following device usage increased significantly only in group A (A P<0.0001, B P=0.05, C P<0.05) but was not different with long term use. There was a significant difference in the venous clinical severity score between week 0 and 6 in groups A (6.32±2.41 vs. 7.32±3.00, P=0.04) and C (7.46±3.80 vs. 4.00±3.03, P=0.003) but not in other QoL measures.

Conclusions: This trial demonstrated a significant improvement in venous circulation and prevention of oedema with NMES in patients with CVD.

New generation of transilluminated powered phlebectomy (Trivex) procedures utilizing only tumescent anesthesia in appropriately selected patients: are the patients satisfied?
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Background: The patients’ satisfaction following new generation of transilluminated powered phlebectomy (TRIVEX) procedures utilizing only tumescent anesthesia was examined.

Methods: Data including demographics, pain scores and duration of operation were collected. Patient satisfaction was examined by later phone survey with patients’ answering the question: would you undergo this operation again if needed?

Results: Results will be presented at the Meeting as the study is still ongoing.

Conclusions: The performance of the procedure under tumescent anesthesia enables avoidance of possible complications of general or regional anesthesia, same-day discharge in most cases and easy positioning of patients during the operation which is needed to complete this extensive procedure. The main problem is pain during the operation even after pre-operative oral sedation and pain distraction methods. However, most of the treated patients are willing to repeat the procedure if needed as they understand that it may be the best solution to their problem when the disease is very extensive, especially when they had previously undergone operations or foam sclerotherapy in the past. Most of our patients were also overweight, and had been advised to be treated conservatively, which left them unsatisfied.

Computational fluid dynamics analysis for the portal venous system and the simulation of a portosystemic shunt based on a CT scan feasibility study
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Background: A transjugular intrahepatic portosystemic shunt (TIPS) is a type of hemodynamic treatment for portal hypertension. Computational fluid dynamics (CFD) studies are widely used for arterial disease. The aim of this study was to explore the feasibility of a CFD study for the portal venous system and the simulation of TIPS based on computed tomography (CT) scan data.

Methods: We retrospectively reviewed a patient’s hepatic contrast-enhanced CT scans before and after a TIPS procedure. The Digital Imaging and Communications in Medicine (DICOM) formatted clinical images were imported into the medical image processing software Mimics to reconstruct 3D models of the patient-specific portal venous system. A stent-graft was simulated with a Geometry module in the CFD software ANSYS and a CAD module in Mimics. The hemodynamic study was completed in ANSYS Workbench.
Results: The portal blood flow had a laminar pattern. Before the TIPS was inserted, the superior mesenteric vein (SMV) flushed exclusively the right portal branches, whereas the splenic vein (SV) flushed both the right and left portal branches. The pressure distribution was not uniform in the portal venous system. With the shunt, the pressure of the portal system decreased: some of the blood from the SMV was diverted, and the remaining flushed the right portal branches; the blood from the SV was almost all diverted. When the simulated stent-graft was intentionally positioned into the right portal branch or the portal trunk, different hemodynamic changes were observed through CFD analysis. The wall shear stress could also be analyzed for the patient’s portal venous system with the shunt in place.

Conclusions: CFD study is technically available for the portal venous system before and after TIPS based on vascular geometry digitized from a CT image. The simulation of the stent-graft and the portal venous system could help foresee the hemodynamic changes of the system, which will help improve the design of the TIPS procedure.

Wise Information Technology (WIT) for VTE
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Background: To establish the prevention and control with Wise Information Technology (WIT) system of venous thromboembolism (VTE) in big data era.

Methods: Through the depth of integration of the HIS system, the West China Hospital mobile medical software and WeChat platform to build a big data era VTE prevention and control system. All patients in West China Hospital underwent VTE risk assessment and corresponding preventive measures according to different levels of risk on admission. Once the VTE was diagnosed, early automatically warning would be performed through the HIS system, WeChat mobile phone to remind the doctors of relevant departments (Department of vascular surgery, respiration, etc.). Through long-term follow-up management with mobile medical software, the patients would be subsumed into the VTE management group, even discharge to ensure the full course of treatment and avoid lost.

Results: The prevention and control system of VTE in West China Hospital has been successfully constructed with the depth of integration of the HIS system. Based on over 600,000 patients underwent primary evaluation by paper for more than 5 years, over 3,000 patients were brought into WIT system in recent 2 years.

Conclusions: Through electronic WIT systems, it is very efficient and convenient of prevention and control of VTE in the era of big data.

Ultrasound Guided Foam Phlebectomy (UGFP)
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Background: To describe a novel method for eliminating branch varicosities following endovenous truncal ablation utilising the synergistic properties of ultrasound guidance (UG), foam sclerotherapy (FS), and ambulatory phlebectomy (AP).

Methods: UGFP was performed as an adjunctive treatment for eliminating residual varicosities in patients having undergone earlier truncal ablation in a small prospective “proof of concept” trial study of 11 consecutive patients. Standard clinical marking of varicosities was performed. 1.5% STS foam (3-10ml, 1:4 Tessari with 100% O2) was administered to the veins to be avulsed allowing the target varicosities to be readily identified on ultrasound. AP was first performed in the usual surgical manner. UG was then used to confirm completeness of vein removal and direct further placement of incisions and guide hook placement if residual varicosities were identified. The number of additional incisions directly related to UG was recorded. Patients were reviewed clinically and with ultrasound at around 1 week (5-14 days) to determine success of treatment and exclude complications.

Results: All patients had additional incisions (2-4) that were a direct result of UG allowing for more complete removal of target veins than with “standard” phlebectomy. No complications were encountered at follow-up.

Conclusions: Early results suggest UGFP is safe and improves the effectiveness of vein clearance with AP. Understanding how this translates to patient outcomes over traditional AP would require a large randomized controlled study.
VENOUS THROMBOEMBOLISM

Treatment of superficial vein thrombosis: update and current recommendations

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Background: Superficial Vein Thrombosis (SVTs) were for a long time considered to be a benign disease. Recent studies have shown their potential seriousness. A concomitant deep vein thrombosis (DVT) was identified in 25 to 30% of patients at presentation, and a pulmonary embolism in 4 to 7% of patients. Subsequent VTEs were reported in 3 to 20% of patients. Management has changed. Until recently, although numerous anticoagulant strategies had been tested, none had clearly demonstrated its clinical benefit. Recently, The Calisto study has validated a protocol based on fondaparinux 2.5 mg daily for 45 days, leading to update the recommendations.

Our objective is to present the rational and update of the management of SVT of the legs and the current recommendations and guidelines. Methods: All patients with SVT should have bilateral duplex scanning:
- To assert the diagnosis of SVT;
- To determine the precise location and extent of the SVT;
- To diagnose or rule out the presence of DVT (25 - 30%).
(Level of evidence: high)

Treatment: On the basis of the data of the literature and in agreement with the last ACCP recommendations and the conclusions of the Cochrane review, it is logical to recommend, in patients with symptomatic SVT of at least 5 cm in length, the use of a prophylactic dose of fondaparinux or LMWH for 45 days over no anticoagulation (Grade 2B). Wherever the cost of treatment with fondaparinux is acceptable, we suggest fondaparinux 2.5 mg daily over a prophylactic dose of LMWH (Grade 2C).

Conclusions: However, the recommendations and guidelines are of a low grade. Some questions remain in the management of SVT. Some risk factors for subsequent development of VTE have been identified but further research is needed to clearly define subgroups of patients with a higher incidence of VTE after SVT.

Catheter directed thrombolysis in deep vein thrombosis, technique and results

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Background: Catheter directed Thrombolysis In Deep Vein Thrombosis, Technique And Results.

Methods: Vascular Ultrasonography is diagnostic. Untreated it results in pulmonary embolism (PE), pulmonary hypertension (PAH) or Post Thrombotic syndrome (PTS). In CATHETER DIRECTED THROMBOLYSIS (CDT) a Tissue Plasminogen Activator (TPA). (Urokinase, r-tpa) is delivered intra thrombus and effective thrombolysis achieved. Retrospective analysis of 243 CASES OF DVT, treated with Urokinase was done. 150 M, 93 F, age 18 to 80 years. Symptoms 1 week to 4 months. 168 cases with post procedure Warfarin and 75 of Rivaroxaban. USG guided puncture of Popliteal vein or PTV was done and sheath placed. Multi-hole catheter advanced intra thrombus. Thrombolysis done with urokinase 25000units/hr. Check fluoroscopy as required. Adjuvant heparin was given. Procedure terminated at complete resolution or a maximum of 1 million unit infusion.

Post procedure oral anticoagulant was given with INR set at 2.50. New regimen: Post procedure Rivaroxaban: 15 mg/day for 1 month and then 10 mg/day for two months. This helps resolve remote thrombotic load. After 3 months aspirin 75 mg/day started to last for 1 year. A check USG was done in each case after 3 months and at 6 months.

Results: Complete Resolution: 206 Cases, Partial Resolution 33 Cases Re-thrombosis: 2 Cases.
No Result: 2 cases
Follow-up: 8 yrs.: PTS 5, Secondary Varicose Veins: 02

Conclusions: TPA delivered intrathrombus gives optimum results in DVT, preserves valves and prevents PTS.

Addition of Rivaroxaban and omission of warfarin has changed the need to check INR and reduced the socio economic burden to the patient.

Percutaneous mechanical thrombectomy in the treatment of acute deep venous thrombosis

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Background: To evaluate the effectiveness of percutaneous mechanical thrombectomy in the treatment of acute deep venous thrombosis (DVT).

Methods: Twenty-six cases of acute deep venous thrombosis, which were diagnosed as iliofemoral venous thrombosis, were reviewed who had received percutaneous mechanical thrombectomy from March 2016 to January 2017 in Shanghai Renji Hospital, including 24 cases in left leg and 2 cases in right, male 11. Patient's age was from 27 to 82 years, average 57.5 yrs. All cases received anticoagulation treatment for over 6 months after the procedure. Follow-up was from 6 to 13 months, average 10.4 ms.

Results: 23 cases (88.5%) were performed through contralateral common femoral vein. Technical success rate was 91.3%. Two cases were done through ipsilateral superficial femoral vein and one through popliteal vein. 23 cases co-existed with iliac vein suppression syndrome (IVS). During these patients, 11 cases (11/23 47.8%) were treated by PTA, 12 cases (12/23 52.2%) by stenting, 10 cases (10/23 43.5%) by cathetered-direct thrombolysis simultaneously. There were 12 cases with complications, including 8 cases (30.8%) hemoglobinuria, 3 cases (11.5%) hemolytic jaundice, 1 case (3.8%) arrhythmia. Even so, all those complications were faded away in one to three days. Of all study follow-up, 3 cases (11.5%) with post-thrombotic syndrome.

Conclusions: Percutaneous mechanical thrombectomy is safe and effective in the treatment of acute deep venous thrombosis.

Flying and VTE risk in the context of superficial venous interventions

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Background: Varicose vein (VV) surgery is common practice worldwide, and, increasingly, day case, minimally invasive intervention. Despite this, there is an associated risk of venous thromboembolism (VTE), in the context of a condition that in itself represents a risk factor for VTE development.

Air-travel is also very common, and patients may even fly to their treating physician to undergo venous interventions. The association between VTE and flying has been well documented. What advice can therefore be given to patients undergoing VV surgery asking: “Doctor, when can I fly?”

Methods: A systematic review was performed, searching for articles...
relevant to [(deep vein thrombosis) or (deep venous thrombosis) or (venous thromboembolism)] and [(flying) or (air travel)].

**Results:** The evidence regarding the effect of air travel on the coagulation system was highly heterogeneous. Flight time of >4 hours, window seating and immobility have been identified as risk factors for the development of VTE. VTE risk is increased in the 2–6 weeks following air travel. The majority of studies explored the relationship between general surgical or orthopaedic procedures and VTE risk. No studies assessed risk in patients who had undergone minimally invasive VV surgery. There is evidence that flying may increase the risk of VTE for up to 6 weeks following travel. Phlebologists should consider postponing VV intervention in the 6 weeks following long-haul travel, or consider interventions to mitigate VTE risk.

**Conclusions:** There is a paucity of evidence regarding the risk of VTE and flying in the context of minimally invasive VV surgery. There is evidence that flying may increase the risk of VTE for up to 6 weeks following travel.

**Antithrombotic practices following venous stenting: towards global expert consensus**

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**Background:** Deep venous stenting is becoming increasingly used in the treatment of deep venous obstruction, however there is currently no consensus regarding post-procedural antithrombotic therapy. The aim of the present study is to determine the most commonly used antithrombotic regimes globally and facilitate expert consensus.

**Methods:** An electronic survey containing three clinical scenarios on venous stenting for May-Thurner syndrome, acute DVT, and post-thrombotic syndrome was distributed across four societies whose members included vascular surgeons, interventional radiologists and haematologists. The results of the initial survey (phase 1) were used to produce seven consensus statements, which were distributed in the second round (phase 2) to the respondents for evaluation. Consensus was defined as endorsement of a statement by more than 66% of the respondents.

**Results:** The phase 1 survey was completed by 106 experts, who practiced in 78 venous stenting centers in 28 countries. Sixty-one respondents (58% response rate) completed the phase 2 survey. Five out of seven statements met consensus criteria. Anticoagulation was a preferred treatment during the first 6–12 months following venous stenting for a compressive iliac vein lesion, while no agreement was reached regarding the role of long-term antiplatelet therapy. Low molecular weight heparin was the agent of choice during the first 2–6 weeks. Life-long anticoagulation was recommended after multiple DVTs, while discontinuation of anticoagulation after 6–12 months was advised following venous stenting for a single acute DVT.

**Conclusions:** This is the first study to achieve expert consensus on pertinent issues regarding the choice of antithrombotic regimes following venous stenting.

**Treatment of severe acute deep venous thrombosis in lower extremity**

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**Background:** To explore the method and effectiveness of treatment for severe acute deep venous thrombosis (DVT) in lower extremity.

**Methods:** Forty-nine patients with severe acute DVT treated in our hospital from January 1, 2002 to December 31, 2016 were retrospectively analysed. All the patients had limb edema and pain, 20 had limb cyanochroia, 5 had limb pallor, 10 had weakened dorsalis pedis artery pulse, 14 had silent dorsalis pedis artery pulse. Colour Doppler ultrasonography revealed DVT and superficial venous thrombosis in all diseased limbs. 22 patients underwent surgical thrombectomy, of which 3 were simple thrombectomy, 11 were supplemented with suprarepubic saphenous vein bypass, 8 with suprarepubic PTFE graft bypass. 27 patients underwent endovascular treatment, of which 8 with CDT thrombolysis, 19 patients with Angioplasty thrombosis and iliac vein angioplasty plus stents.

**Results:** Limb edema relieved in 39 patients (79.6%), reduced in ten patients (20.4%). All diseased limbs regained normal artery pulsation and skin appearance. 46 patients (93.8%) were followed-up by a mean of 65 months. Limb edema disappeared in 30 patients (65.2%), reduced in 12 patients (26.1%), recurrent in 4 patients (8.7%). Among three recurrent patients, one died of malignant tumor 9 months after operation, three had their graft occluded resulting from intimal hyperplasia.

**Conclusions:** Surgical thrombectomy is an effective method for treating severe acute DVT in lower extremity.

**Endovascular treatment of deep vein thrombosis and pulmonary thromboembolism**

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**Background:** Around 50% of untreated deep vein thrombosis/DVT/ cases are complicated by/Pulmonary Thromboembolism/PTE. Submassive form of PTE presents with symptoms of respiratory and cardiac failure and require urgent and more radical treatment. The aim of this study is to identify the potential of endovascular therapy combined with local fibrinolysis in patients with DVT and submassive forms of PTE.

**Methods:** 69 patients / 35 male and 34 females/with diagnosed DVT complicated with submassive form of PTE were treated successfully by endovascular methods. We established thrombosis of the iliac, femoral or popliteal vein in the DVT patients using EchoDoppler. PTE was diagnosed clinically and with CT pulmonary angiography. Pulmonary artery pressure was measured with echocardiography. The diagnosis was confirmed with conventional angiography.

**Results:** In all patients with confirmed diagnosis of PTE, endovascular treatment was performed – thrombus fragmentation and local fibrinolysis with t-plasminogen activator/TPA/. We found decrease in pulmonary pressure, partial or complete recanalization of embolism and clinical improvement. Patients were treated with new oral anticoagulants for a period of 6–12 months.

**Conclusions:** DVT complicated with submassive form of PTE can be treated successfully endovascular and with local fibrinolysis in the acute phase and with new oral anticoagulants in the chronic phase of the disease.

**Endothermal heat induced thrombosis of great saphenous vein**

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**Background:** The EHIT is a pathognomonic complication of thermal ablation. Background: to evaluate incidence, progression and risk factors.

**Methods:** Study: non-randomized,retrospective. Period: 5years. Technique: percutaneous,in ambulatory unit with local anesthesia and sedia-
tion. Materials: 1470 nm diode laser,bare tip fibers. Population: 1063 GSV. Sample: 16 patients. Method: We measured the diameter of GSV at the SFJ, the reflux time, the distance from the tip of the fiber to the terminal valve and residual stump. Diagnosis and progression of EHIT: 3rd, 7th and 30th day. Not simultaneous complementary treatment. We analyzed demographic data: sex, age and clinic severity. We indicated DVT prophylaxis according to risk factors and CT after EVLA.

Results: Incidence:
3rd day: 1.22%
- Type1: (1050MMII)98.787%
- Type2: (12MMII)1.128%
- Type3: (1MMII)0.09%
- Type4: 0%
7th day: 1.51%
- Type 1: (1047 MMII) 98.49% 3patient EHIT type2.
- Type2: (15 MMII)1.41%
- Type3: (1 MMII)0.09%
- Type4: 0%
EHIT progression:
-3patients with EHIT2 resolved SS
-3patients with EHIT1 progressed to EHIT2.
DVT and TEP: not detected.
Comparison: G1:no EHIT versus G2:EHIT
- Age: G1:53.70/G2:62.40 SS
- Sex: male G1:32/G2:56.25% SS
- Degree of reflux: severe G1:89/G2:87%, No SS.
- Diameter of GSV: G2:116/G1:92mmSS
- Mean distance of the fiber tip:2 cm (1.8-2.3 cm), No SS
- Residual GSV stump: 2.3 cm (1.4-3.3 cm), No SS.

Conclusions: Incidence of EHIT is low, early DUS determines increase the diagnosis rates and progression; Risk factors associated with increased rate,age,sex,vein size; Clinical severity,degree of reflux,position of the catheter tip, and length of stump were not a risk factor. We do not perform simultaneous complementary treatments,and perform DVT prophylaxis in all patients according to the risk, therefore these cannot be considered as bias. EHIT resolves in 1 month in most patients. EHIT is due to technical problems rather than a thrombotic tendency of the patient itself.

Tinzaparin for the treatment of superficial vein thrombosis of the lower limbs
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Background: The optimum duration of anticoagulation to treat superficial vein thrombosis (SVT) of the lower limbs has not been fully studied. The aim of our study is to investigate the optimum duration of treatment with tinzaparin in patients with lower limb superficial venous thrombosis.

Methods: Consecutive patients with SVT were treated with subcutaneous tinzaparin (Innohep™, LEOPharma A/S, Ballerup, Denmark).

Tumor patients with PICC correlation between upper limb deep vein thrombosis risk factor analysis
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Background: To analyze risk factors for upper limb deep vein thrombosis of the tumor patients with PICC.

Methods: Collected the clinical data of 892 cases of tumor patients with PICC catheter and analysis, to explore the related factors of upper limb deep vein thrombosis. Using the method of single factor and multiple factors.

Results: 22 cases with upper limb vein thrombosis in the 892 cases, the incidence of 2.5%; Single factor analysis and multiple factor analysis are statistically significant factors for: catheter type, catheter related complications, prothrombin time, fibrinogen content (P<0.05); And sex, age, tumor type, merge disease, catheter vein catheter indwelling time, platelet count, prothrombin time, partial blood coagulation time live enzymes, D-dimer, chemotherapy drugs, chemotherapy reaction has no statistical significance (P>0.05).

Conclusions: Tumor patients with PICC catheter increase the risk of upper limb venous thrombosis, prior to the decision to patients with catheter, we must pay attention to assess the patient’s blood coagulation index for catheter, choosing the appropriate catheter, and attaches great importance to the catheter after intervention and maintenance, in order to minimize the thrombosis caused by PICC.
Are recurrent varicose veins after endovenous treatment or after surgery so different?  
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Nowadays the term ‘recurrent varicose veins’ has been replaced by PREVAIT (= PREsence of VArices after Interventional Treatment). In patients with PREVAIT we have to differentiate between residual and recurrent varicose veins.

Residual varicosities depend on the pre-treatment distribution of varicose tributaries. Varicosities in direct connection with the refluxing trunk may tend to shrink after endovenous ablation (EVA) whereas other varicosities, related to other ‘escape points’ may persist. Such residual varicosities may be treated after a certain interval by means of phlebectomies or foam sclerotherapy (FS). Surgery (consisting of high ligation and stripping) usually includes phlebectomies from the start, which means there should not be residual varicose veins immediately after well performed surgery. Hence the difference in residual varicose veins after both approaches mainly depends on the timing of the assessment.

Recurrent varicose veins re-appear at the same or at a different site of the previously treated truncal and tributary veins. Randomized clinical trials with long-term follow-up, of at least 5 years (so far mainly comparing endovenous laser ablation with surgery) have clearly shown there is absolutely no difference in the incidence of clinically obvious recurrent varicose veins (40 – 50%). This is also reflected by the lack of difference in the venous clinical severity score (VCSS) and disease-specific quality of life scores, containing the presence of varicose veins as an item to be scored (e.g. AVVSS, HVVSS). On the contrary, what is clearly different is the duplex ultrasound (DUS) appearance, with different DUS patterns of recurrence after EVA compared to those after surgery:

- At the saphenofemoral junction (SFJ) recurrent reflux may be observed: after surgery of the great saphenous vein (GSV) neovascularization is more frequently seen, whereas after EVA refluxing SFJ tributaries appear to be more frequent. This results in a significantly higher rate of recurrent varicose veins originating from the SFJ region after EVA than after surgery. A typical anatomic pathway of recurrence after EVA is (persistent or recurrent) reflux at the SFJ and anterior accessory saphenous vein (AASV), reported in 20 to 40% of treated limbs.
- At the level of the treated trunk segmental or complete recanalization may occur after initial successful obliteration in 5 – 15% of treated truncal veins. This is obviously not the case after successful stripping of the target vein, although so called ‘revascularization of the strip track’ may occur and result in clinical recurrence.
- Perforating veins may also play a role in recurrence, although the available literature is conflicting and it cannot be concluded whether their incidence and role in recurrence is different between surgery and EVA.

Finally, new sites of reflux may be due to progression of the disease resulting in clinical recurrence, both after EVA and after surgery.

Ultrasound examination of recurrent varicose veins
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Varicose vein treatment (VVT) may result in a variable recurrence rate (up to 50% at 5 years after surgery). Duplex-based recurrence rate is usually higher than the clinical one, as many refluxing veins may not be clinically relevant. Colour-duplex ultrasound (CDU) highlights different morpho-hemodynamic patterns related to recurrence after surgery or endovenous thermal/chemical ablation. Adequate settings (e.g. low PRF) and operator’s skill objectively influence accuracy of CDU investigation. A few of the possible causes of recurrence are: progression of the disease with newly formed (refluxing or not) varices in the treated limb or pelvic refluxes, (neo)vascularization in the groin/popliteal areas or in the saphenous compartments, technical and tactical mistakes with residual refluxing veins, subsiding deep vein abnormality.

CDU after VVT is aimed at detecting any new or persistent source of reflux from residual saphenous junction stump, inguinal or popliteal varicose network, accessory saphenous vein, perforators (up to 75.8% of new incompetent perforators in Van Rij’s experience), non saphenous veins (e.g. pelvic, perineal, glutal, sciatric nerve varices). In a few cases recurrent refluxes are not associated to any escape points from deep veins. CDU-based follow-up has a 100% predictive value for clinical recurrence at 5 years as reported by M.De Maeseneer.

Post-surgery recurrence may differ from post-endovenous ablation recurrence, as the latter presents a much lower groin/popliteal neovascularization rate (typical of surgery) and possibly a degree of recanalization of the treated stem. Different morphologic and hemodynamic findings are highlighted after thermal or chemical ablation as to the treated trunk/s: obliteration (visible or invisible), partial patency, complete patency, residual lumen, length of the patent tract; no flow, antegrade/retrograde flow, reflux duration.

After VVT the combination of CDU investigation with clinical assessment (symptoms in primis) represents the best approach to follow-up and possibly suggest an adequate re-treatment.
ULCERS AND WOUND CARE

What improvements in patient treatment have arisen from research into the cause of venous ulceration?

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A great deal has been discovered about the causes of venous leg ulceration during the last 100 years. It used to be thought that ‘venous stasis’ i.e. lack of blood flow was the cause of leg ulceration. However, it has been shown that in patients with lipodermatosclerosis, increased blood flow is present in the limb and in the skin. It has been clear for many years that raised venous pressure in superficial veins is the physiological abnormality leading to the development of leg ulceration. In 1988, my colleagues and I proposed a ‘white cell trapping’ hypothesis which sought to explain our observations that leucocytes were ‘trapped’ in the lower limbs during periods of venous hypertension. We thought that this might cause occlusion of capillaries leading to hypoxia of the skin. In fact, we were later able to show that skin hypoxia was present and discovered that many inflammatory processes were at work in the skin in our patients with venous disease. These have been elucidated in much greater detail by subsequent authors. It would be reassuring to know that these advances in knowledge have led to improved patient outcomes. However, the use of drug treatment in patients with leg ulceration has shown modest efficacy with a very limited number of drugs. There has been no dramatic improvement in leg ulcer healing. In the interim, much better ways of treating varicose veins have been developed and these appear to be of great benefit in many leg ulcer patients. Patients with leg ulceration often have similar impairment of venous function compared to those without leg ulceration. The reasons why some patients develop leg ulcers are still not well understood. Further elucidation of this conundrum may lead to the development of better pharmacological treatments for venous ulceration.

Venous leg ulcers can be markedly reduced in a population by establishing care pathways and early performed venous surgery

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Background: To assess the effectiveness of management changes performed following the initial series of studies 1988-1992, based on repeated assessments regarding number of patients and aetiology spectrum changes over time. We wanted to see if the generally expected increase of patients with lower limb ulceration could be prevented by performed management changes.

Methods: In Skaraborg county with a population of around 250,000 a unique series of cross-sectional epidemiological studies have been undertaken between 1988 and 2014. Large samples of identified patients have been assessed, in detail regarding history, clinical appearance and regarding causes of ulceration. The major measures for improving management quality were, creation of treatment guidelines and care pathways, easily available venous CDU and early use of vascular surgical intervention for venous and arterial ulceration. The outcomes based on patients in contact with the health care system were compared for 1988, 2002 and 2014.

Results: Despite having an older population and and substantially more patients with diabetes today the point prevalence of open ulceration has decreased by 37% since 1988. The most marked projected reduction was noted for venous ulcers 71%, from 429 patients in 1988 down to 125 patients in 2014. Venous ulcers have been reduced from being the dominating aetiological factor into just one of five major aetiologies of more equal size in 2014. Our management strategy has been successful and we have been able to substantially decrease lower limb ulceration within our population, despite the generally expected scenario with increasing number of ulcer patients.

Conclusions: You can reduce lower limb ulceration and especially venous ulceration substantially by structured multidisciplinary management. We believe that early diagnosis and referrals of patients for specialist assessments and especially vascular surgical interventions may have been most important. Early performed correct diagnosis and interventions are essential parts for reproducing these results elsewhere, which ought to be feasible worldwide.

Effects of adipose-derived stem cells treatment in recalcitrant chronic leg ulcer: a phase 2 randomized control trial
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Background: Adipose tissue has been described as a source of different types of stem cells (ASCs). Preclinical studies on ASCs gave rise to an exponential increase in data, and observational reports seems to indicate ASCs as a safe and promising tool to treat non healing venous leg ulcer (VLU). However standardized protocol for cells treatment as well as randomized clinical studies are currently lacking.

Methods: From an initial cohort of 38 patients, 8 patients (5 men, 3 women) affected by non healing VLU were randomized respectively to gold standard treatment (control arm) and to gold standard treatment plus ASCs (experimental arm). Synchronously we investigated the functional and the immunophenotypical features of the harvested stem cells. The primary outcome measures were the healing time and the safety of the cell treatment. Secondary outcomes were: pain evaluated by NRS; the complete wound healing at 24 weeks; the Margolis Index (MI = the percentage change in area of an ulcer over the first 4 weeks of treatment). Finally, the lab parameters of ASCs expansion and cytometric analysis were correlated with the clinical outcomes.

Results: No relevant adverse events followed to cell treatment. The healing time was significantly faster by applying ASCs, 17.5±7.0 weeks in the experimental arm vs. 24.5±4.9 weeks recorded in the control group (P<0.036). NRS dropped after the first week to 2.7±2.0 in the experimental arm vs. 6.6±3.0, in the control group (P<0.01). MI and the rate of healing at 24th week was not significantly different between arms. Very interestingly we found a strong reverse correlation between the % of CD34+/CD45- respectively with the healing time (r=-0.894, P<0.041) and NRS (r=-0.934, P<0.020).

Conclusions: ASCs is safe and may accelerate the healing time in VLU as well as reduce the wound pain. % of CD34+/CD45- is a lab parameter predictive of successful ASCs treatment.

Incidence of asymptomatic occlusive iliac vein lesions in C5 and C6 disease and their predictive value for ulcer healing
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Background: To study the incidence of asymptomatic iliac vein occlusive lesions in patients with C5 and C6 C6 disease.

Methods: The study was approved by the Institutional Review Board and the Ethics committee. It is a prospective study done from July 2015...
to June 2016. All patients who were admitted for endovenous ablation of the superficial vein and had C stage 5 and 6 disease were included in the study after an informed consent. Patients underwent ascending venogram through a femoral vein cannulation via GSV puncture at the commencement of endovenous ablation. The findings considered abnormal on venogram were presence of collaterals, splaying of veins, reflux of contrast into the internal iliac vein, narrowing of the veins compared to the adjacent normal vein or contra lateral normal side and presence of occlusion. The patients were reviewed at 12 weeks to assess for wound healing. Analysis was done to correlate the rate of wound healing in patients with positive findings venogram.

**Results:** Total number of 104 patients were included in the study. There were 94 males and 10 females. 70 patients had symptoms on the left leg and 34 patients on the right leg. There were 33 patients with healed ulcer and 71 patients with active ulcer. 66% of patients with active ulcers and 70% of patients with healed ulcers had positive venogram findings. On follow-up at 12 weeks, among patients with persistent ulcers 90% had abnormal findings on the venogram, while patients who had healed ulcers only 40% had abnormal venogram. The difference was statistically significant.

**Conclusions:** The incidence of non-occlusive iliac vein pathology as indicated by an abnormal venogram is high in patients with advanced chronic venous insufficiency. The ulcers of patients with abnormal venogram are less likely to heal at 12 weeks duration. Ascending venogram is a valuable and cost effective investigation for patients undergoing endovenous ablation for C5 and C6 disease.

**Breaking paradigms: a new theory on genesis of the venous ulcer. Pre-eliminary report**

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**Background:** Venous ulcer has been considered traditionally as the main sequel to chronic venous insufficiency. Is considered to be caused by an increase in distal venous pressure, hence therapy is directed to reduce these pressure, either with inelastic bandages, special stockings, surgery and others. There are some reports that relate the ulcers and the angle of ankle flexion, since the main mechanism of venous return is the muscular pump of the calf and if this pump does not work properly the blood return will not be effective.

**Methods:** We designed a test to verify the limitation of dorsiflexion, which consists of placing the patient standing and without swinging back or folding the trunk, ask him to lift the tips of the feet, if he can’t or if they are less than 10 degrees the maneuver is positive to short gastrocnemius syndrome, between 10-20 degrees is moderate and if he can lift them without difficulties (+ 20 degrees) is negative. All the patients with venous ulcer and positive test were include. Doppler USG and measures of diameters and velocity were made in great saphena, popliteal and femoral veins before and after. We perform a proximal release of the medial twin and other muscles involved in the biomechanics of gait. Described observations show that even the future treatment of venous insufficiency may not be the elimination of the saphenous vein, but rather a good hygiene in the biomechanics of gait. We still need to go further in this kind of studies but this new theory about venous insufficiency would be a breaking point in the concepts of phlebology.

**EVRA (Early Venous Reflux Ablation) ulcer trial: baseline characteristics & event rates**

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**Background:** The timing of offering superficial venous intervention to patients, in terms of its effect on leg ulcer healing is controversial. We present a trial designed to clarify the issue.

**Methods:** Patients were randomized to either early endovenous treatment of superficial venous reflux in addition to standard care compared to standard care alone. All patients were seen in an out-patient clinic at 6 weeks (with a duplex taken in the early group), in addition to monthly telephone follow-ups plus weekly ulcer healing verification visits are performed upon notification of healing. Quality of life is measured at several time points. The trial closed to recruitment on 30th September 2016.

**Results:** 6555 patients (51% men; 49% women, mean age 72) were screened, with 450 patients randomized (7% inclusion rate; 56% men; 44% women, mean age 68). 27% of patients screened were ineligible with respect to ulcer duration. The median baseline ulcer duration is 3.1 months and the median size was 3.0cm. Venous incompetence pattern were: 56% GSV incompetence alone, 13% SSV incompetence alone and 25% both GSV and SSV incompetence combined; 27% had evidence of deep venous incompetence. The interventional treatment strategy employed was 53% with foam alone, 26% with endothermal ablation alone and 20% by a combination of therapies. To date a total of 336 (81%) ulcers have healed within 12 months.

**Conclusions:** This study will be the first large randomized multicenter trial to report on the clinical, quality of life and cost effectiveness of treating patients with venous ulcers by early superficial venous intervention.

**Surgical treatment of chronic venous leg ulceration results from Paraguay**

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**Background:** chronic venous insufficiency is the main cause of the apparition of the leg ulcer. The treatment of venous leg ulcers is a common and sometimes difficult problem. They can be costly to treat and are associated with loss of working capacity and sometimes significant morbidity. We present here the results of surgical treatment in our surgical service in the university hospital of Asuncion, Paraguay.

**Methods:** Seventy consecutive patients with 86 venous leg ulcers underwent history, clinical and color doppler examination (Sonosite tiant.7.5/10 MHz probe.). The contour of the ulcer was traced on transparent dressing and area of ulceration calculated In patients with bilateral ulcers, each leg was considered separately. If multiple ulcers were pre-
sent on the same limb their areas were summated. Exclusion criteria comprised age >80 years, patient unable to walk, peripheral arterial disease and/or an ankle brachial index <0.9. The study group therefore comprised 86 ulcerated limbs in 45 female, 25 male, mean age 63 patients with primary sapheno-femoral and/or popliteal junction (SFJ, SPJ) and long and/or the short saphenous vein (LSV, SSV) disease. Patients were randomized and followed for 3 years. Written informed consent and ethical committee approval was obtained.

Results: Patients with reflux at the saphenofemoral junction or long saphenous vein were offered saphenofemoral junction disconnection, stripping of the long saphenous vein to below the knee, and calf varicosity avulsions. Venous reflux in the short saphenous vein was treated with saphenopopliteal junction disconnection and calf varicosity avulsions. We treated patients who were considered unfit for general anaesthesia, under local anesthesia and all the patients complete the closure of the ulcer after 4 weeks of surgical treatment no major or minor complication was seen at our surgical group. After the third year of follow-up only 4 of the seventy cases has recurrence with the ulcer.

Conclusions: Surgical correction of superficial venous reflux plus compression bandaging reduces the recurrence rate after three years of follow-up of our study instead of only bandaging alone for ulcer treatment.

Ultrasound-guided foam sclerotherapy in the treatment of venous leg ulcers
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Background: Compression therapy remains the treatment of choice of the venous leg ulcer (VLU), but in some patients, the ulcers refractory to the standard conservative treatment are observed. The aim was to determine ulcer healing and recurrence rate in the patients with chronic VLU undergoing ultrasound-guided foam sclerotherapy (UGFS) in addition to the standard compression.

Methods: 76 patients underwent UGFS for superficial vein incompetence in addition to compression for the treatment of VLU refractory to the standard compression and local therapy. An obtained database was analyzed to determine venous occlusion rates, 24-week and 12-month healing rate (HR) and recurrence rate (RR).

Results: 26/76 patients (34.21%) required more than one session of treatment for complete occlusion of great or small saphenous vein, incompetent perforators and varicocities. The 3 and 6 months healing rates were 67.1% and 92.1%, respectively. The patients with isolated arterial reflux had higher healing rate than those with arterial and perforator incompetence or those with isolated perforator incompetence. The median healing time was 3.37 months (IQR 1.15 months). The estimated 12-month recurrence rate was 3.9%. The ulcer duration, large initial ulcer area, history of previous ulcers and deep vein thrombosis and previous surgical treatment of varicose veins had an influence on HR and RR.

Conclusions: UGFS appears to be an attractive minimally invasive technique to treat superficial vein reflux in patients with VLU and is associated with high HR and low mid-term VLU RR.

Assessing hemodynamic and ceap classification in 276 patients with venous leg ulcers in Ecuador: a case series
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Background: Varicose veins are categorized according to severity in the Clinical, Ethiological, Anatomical and Pathophysiological (CEAP) classification for chronic venous disease. Healed and active ulcers are classified as C5 and C6. Obstruction associated with the incompetence of deep veins is a factor that contributes active ulceration and incompetent perforating veins (IPVs) are a causal factor. To examine the hemodynamic pattern associated with the clinical (C) and anatomical (A) classes of CEAP a population of patients examined in missions in Ecuador in 2014-2016.

Methods: The ultrasound examination with venous mapping was performed to detect venous shunts and subtype in 276 consecutive patients. We examined 311 lower limbs in 72 males and 200 females aged 7-90 years (mean 56.8, 241 mono and 35 bilateral). We recorded C1-C6 and A (As1-5, D6-16, P17-18) CEAP classes including main and the secondary shunts and the number of IPVs.

Results: 64.9% of lower limbs were in C2 class, while C3 to C6 classes were present in a small number of cases (8.1% were C5 (5.4%) and C6 (2.7%)). C1 and C2 were associated with S1-5 superficial classes and 26% of C2 had IPVs. Shunts were totally absent in the C0 class. Open shunts were found in C2, while all limbs with C ≥C4b showed at least one shunt. Open shunts were more frequent in lower C classes and closed shunts in the higher C classes. In C1 the saphenous-femoral and the popliteal junctions were never involved. In almost 50% of the limbs in C2 class, one of the junctions or an intra-saphenous perforator was incompetent.

Conclusions: The total absence of shunts in C0 to the greater rate of closed shunts in higher clinical classes suggest shunts are related to the severity of CVD. Venous ulcers (C5 or C6) should have a closed shunt, which can be disconnected surgically. As an example of exclusion, C1 patients deserve less invasive procedures, owing to the competence of junctions. These findings have important clinical practice implications to healing outcomes.

Effects of adipose-derived stem cells treatment in chronic leg ulcers. A phase II randomized clinical trial
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Background: Adipose tissue is a source of different type of stem cells (ASCs). We investigated safety and effects of ASCs in a phase II randomized clinical trial, in the field of recalcitrant venous leg ulcer (VLU). In addition we evaluated a reproducible methodological approach to standardize the isolation, characterization and the clinical use of the ASCs for ulcer wound healing. Finally, the biological data were correlated with the clinical follow-up of the patients after treatment.

Methods: Sixteen (16) patients affected by chronic venous leg ulcers were randomized. ASCs were harvested using Coleman’s technique and injected into the ulcers. We assessed also: healing time, post-treatment pain with numerical scale (NRS), Margolis Index (MI), and patients healed into 28 weeks. In laboratory a sample of the same cells was processed in order to characterize the amount and the type of stem cell. The in vitro clonogenic output was evaluated as colony forming unit fibroblasts (CFU-F).

Results: The patients treated with ASCs heal in a minor time, 17.5±7.0 weeks vs. 24.5±4.9 (P<0.036). The clinical course was less painful in ASCs arm Z=2.2 vs. 6.6±3.0 (P<0.01). The MI was positive in 50% of patients vs. 25% of controls (P=0.3). High number of CD34+/CD45-stem cells was observed (mean of 8.2±16) and supra adventitial component and pericytes are the most represented. Laboratory results also show a linear correlation between MI respectively with the number of CFU-F (r=0.94), the number of pericytes (P=0.98).

Conclusions: The experimented procedure demonstrated to be safe as well as, by using the standard methods herein assessed in the lab, also significant clinical benefits. This study encourages to plan a wider phase III trial.
ENDOVENEUS INTERVENTIONS AND SURGERY

Randomized controlled trial comparing mecanochemical ablation to radiofrecuency ablation: the multicenter venefit versus Clarivein® for varicose veins (VVCVV) Trial. Long-term follow-up

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Background: Endothermal ablation methods require tumescent anaesthesia, which can be uncomfortable during administration. Non-tumescent non-thermal techniques would therefore have potential benefits. This randomized controlled trial was carried out to compare the degree of pain patients experience while receiving mecanochemical ablation (MOCA) or radiofrequency ablation (RFA). The 6 months clinical outcomes have been reported previously and the longer-term follow-up is being presented here.

Methods: Patients attending for primary varicose vein treatment were randomised to receive MOCA (Clarivein®) or RFA (Covidien® Venefer™). The most symptomatic limb was randomized. The primary outcome measure was intra-procedural pain using a validated visual analogue scale. Secondary outcome measures were change in quality of life and clinical scores, time to return to normal activities as well as the occlusion rate.

Results: One hundred and seventy patients were randomized (51% to the MOCA group). Baseline characteristics, including demographics, CEAP classification, clinical scores and quality of life (QoL) scores were comparable between the two groups. Baseline characteristics including demographics, CEAP classification, clinical scores and quality of life (QoL) scores were similar. The maximum pain score was significantly lower in the MOCA group (24.3mm) compared to the RFA group (34.8mm; P=0.005). Average pain score was, however, similar in the MOCA group (17.8mm) and the RFA group (24.0mm; P=0.053). Seventy-one percent of the patients attended follow-up at 6 months and 21% attended at more than 2 years. The VCSS score at 6 months was 2.5 for MOCA and 2.7 for RFA (P=0.57), with the corresponding figures at longer than 2 years being 2.3 for MOCA and 1.6 for RFA (P=0.29). The time to return to normal activities was again comparable between the two groups. The complete or proximal occlusion rate at 6 month was 87.1% for the MOCA group and 93.2% for the RFA group (P=0.483). At more than 2 years, the complete occlusion rate was 77% for MOCA and 100% for RFA (P=0.175).

Conclusions: The results show that MOCA is less painful than RFA procedure. However, at more than 2 years follow-up, the clinical and specific quality of life scores showed similar improvement in both treatment groups. The occlusion rate was reduced with MOCA compared to RFA, but this did not reach significance.

Randomized controlled study of the efficacy of endovenous laser treatment versus ultrasound-guided polidocanol foam sclerotherapy in small saphenous vein incompetence: one-year follow-up results

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Background: During 3 years, to compare the evolution of the reflux >0.5s and closure rate of the small saphenous vein (SSV), the venous clinical severity score (VCS3) and the quality of life (QOL) of the patients (CIVIC-14) into two groups of randomized patients: one group being treated on D0 by endovenous laser (EVL) and the other by ultrasound-guided foam sclerotherapy (USGFS).

Methods: open randomized prospective clinical trial on two parallel arms. Inclusion criteria: SSV incompetence (trunk reflux>0.5sec), CEAP C2 to C6. Evaluation criteria: venous Duplex-scan assessment, VCSS, CIVIC-14; visits on D0, M6, M12, M24 and M36.

Results: the study covers 144 patients among whom 70 were treated by EVL and 74 by USGFS. Both groups were homogenous (75% female, mean age 58), with equivalent mean trunk diameters (6mm at mid-calf) and a majority of C2s (51%). At M6, rate of reflux=0.5sec was 4% in EVL-group vs 21% in USGFS-group (P<0.01) and at M12, 3% vs 33% (P<0.001) respectively. A total venous closure was observed in 94% for EVL-group vs. 72% for USGFS-group (P<0.01) at M6 and in 97% vs. 62% (P<0.001) at M12 with equivalent length of occlusion (20 and 23cm). At M6, 75% were asymptomatic in EVL-group and 72% in USGFS-group (P:NS) and this rates increases to 86% and 83% at M12 (P:NS). The VCSS was highly improved (P<0.001) in both groups with no difference between them from 6.7 at D0 to 1.4 at M12 in the EVL-group vs. 5.9 to 1.7 in the USGFS-group. The benefit was gained between D0 and M6 and is maintained between M6 and M12. It was the same for the QOL: 21.4 to 4 in the EVL-group vs. 20.9 to 7.4 in the USGFS-group.

Conclusions: the reflux is more frequent in the USGFS-group at M6 and M12 and the closure rate is lower than in the EVL-group. By cons, the rate of asymptomatic patients, the VCSS and the QOL are significantly and similarly improved in both groups.

Open surgery still durable for varicose vein treatment: a one year prospective audit with long term follow-up

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Background: With the introduction of endovenous treatments for varicose veins open surgery was discarded due to the high risk of neovascularization. We found the risks overestimated and set out to perform a one year audit to look at our own results from performing mainly open surgery.

Methods: From Sept. 2009 until August 2010 all varicose vein interventions were registered and prospectively followed with colour Duplex assessments after 4-6 months, 1 and 5 years. In addition Aberdeen Varicose Vein questionaire (AVVQ) was used in addition to Varicose Vein Severity Score (VCSS) to assess patients’ quality of life (QoL) and the disease severity (assessed pre-op and after 1 and 5 years). Duplex assessments were done by vascular technologists not involved in the audit but trained to detect neovascularization.

Results: During the year 236 patients/252 legs were operated and 28% were re-do procedures. Great saphenous vein (GSV) surgery dominated among primary procedures (82%). Re-do procedures took 7 minutes longer to perform (55 vs. 48 minutes) P<0.005. Median age was 55 years (16-87) and 70% were females. Duplex at 4-6 weeks showed good result for 91%. After one year 86% had a good result and neovascularization was noted in 8% after primary surgery. The long term assessment was done after 69 months (39-75) and 67% of all legs was examined. The result was remaining good for 70% and 16% neovascularization was shown after primary surgery and 27% after re-do procedures. VCSS improved significantly from 6 (range 1-22) to 1 after one year and 2 long term (P=0.001). AVVQ scores improved from 20 (range 3-55) down to 9 and 10 respectively (P<0.001). For primary surgery AVVQ remained unchanged between 1 and 5 years whilst for re-do procedures the score deteriorated significantly between 1 and 5 years.
Conclusion: The risk for neovascularization seems to have been overestimated and good long term results can be achieved following open modern surgery. The major problem is to avoid varicose vein recurrence since our results from re-do procedures seem less favourable long term. Currently there is no optimal technique since all contribute to varicose vein recurrence.

Randomized Controlled Trial Of Compression Therapy Following Endothermal Ablation
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Background: Since the turn of the century, endovenous ablation has rapidly progressed to become the main treatment method for varicose veins. It has been demonstrated to be highly effective clinically and to improve the quality of life of patients. There is, however, uncertainty regarding the management post-intervention, especially in terms of post-operative compression. Hence, a randomized study was undertaken to investigate the effects of wearing compression stockings following varicose vein treatment.

Methods: Patients with saphenous vein reflux and undergoing treatment with endothermal ablation were randomized to receive either 7 days of compression stockings or no stockings. The primary outcome measure was the pain score over the first 10 post-operative days. The pain scores, clinical score and time to return to normal activities at 2 weeks and 6 months were assessed, but only the interim results at 2 weeks are presented below.

Results: In total, 134 patients have been randomized, 48.5% of them to the compression group. The mean age was 50 (±16) years and approximately 49% of the population was male. Sixty-five percent of the population attended the 2-week follow-up. The mean daily pain score in the compression group using a visual analogue scale (VAS) was significantly lower at 20.6 (±18) mm, compared to 32.3 (±26) mm in the no compression group (P=0.019). Significantly better pain scores were also noted in the compression group on days 1 to 5 compared to the no compression group.

Conclusions: These interim results indicate that wearing compression stockings following endothermal ablation is advantageous in the first few days following treatment. However, this is not translated in notable clinical differences at two weeks or in the time to resume usual activities.

A clinical trial manager in a multicenter randomized controlled trial
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Background: Clinical trials are a key component of determining optimal medical practise. While numerous individuals are involved in the process, the trial manager’s role is key to a successful outcome. This talk will present the key tasks of a trial manager.

Methods: The trial manager performs a variety of roles from the design of the trial at the grant application stage to ensure feasibility and sufficient patient and public involvement, to optimising and enhancing recruitment to ensure that the project runs to time within the budget, to designing the data collection forms and database and cleaning the data in preparation for the analysis. The trial manager is also responsible for writing the study protocol and designing the associated documentation, training and mentoring the research nurses and local Principal Investigators, ensuring they adhere to the principles of Good Clinical Practice. They also ensure that the Chief Investigator is kept well informed and are the link between the various committees that oversee the safety and integrity of the trial.

Results: It is advantageous if the TM comes from a strong scientific/analytical background, and can work well independently and communicate well with others. They are also required to be highly organized with excellent attention to detail and problem solving abilities. The position goes far beyond an administrative support role and involves strategic management and leadership skills to ensure the success of the study.

Conclusions: In conclusion, the trial manager plays an integral and multifaceted role from the conception to completion of clinical trials in an academic setting.

A comparative analysis of the results of cyanoacrylate ablation and radiofrequency ablation in the treatment of venous insufficiency
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Background: Varicose vein treatment has been directed toward less-invasive yet lasting techniques. The present study was designed to compare the effectiveness of cyanoacrylate ablation (CAA) with that of radiofrequency ablation (RFA).

Methods: The study included 524 and 202 patients who had undergone RFA (ClosureFast Medtronic, San Jose, CA, USA) and CAA (Variclose vein sealing system Biolas Ankara), respectively, within the previous 4 years. The mean age of the patients was 48.4±11.3, and the mean follow-up time was 12.3±6.2 months. Preoperative and postoperative CEAP class, symptoms, recurrence, and Doppler findings of the two groups were compared.

Results: Postoperative Doppler saphenous vein closure rates were 97.3% in the RFA group and 98.7% in the CAA group. The type of operation had no effect on postoperative symptoms, CEAP or Doppler findings. There is no efficiency difference between treatment methods. The predictors of postoperative CEAP class were preoperative CEAP class, bilateral limb disease and prior deep vein thrombosis (DVT), whereas the predictors of symptom recurrence were postoperative perforator incompetence (PI) and preoperative CEAP class. The four-year symptom-free survival rates were asymptomatic rate was 66.3% in the RFA group and 61.9% in the CAA group.

Conclusions: The major disadvantages of current thermal ablation techniques, such as postoperative pain and discomfort as well as skin bruises, paresthesia and burns caused by thermal damage and the need for tumescent anesthesia caused an increasing need for the development of non-thermal, non-tumescent options for shorter and more successfull treatment of venous insufficiency. The CAA seems to be the closest technique to the ideal and suitable for all patients, since it is non-thermal and non-tumescent. The results are satisfactory and are comparable to the RFA. When two techniques are evaluated, CAA may be preferable as a simple application in a shorter time with less early postoperative discomfort. However, still long-term results and cost analyses of larger series need to be documented.
A single center randomized controlled trial comparing radiofrequency and mechanical occlusion chemically assisted ablation of varicose veins in patients with bilateral involvement: initial experience

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**Background:** New non-thermal techniques such as mechanical occlusion chemically assisted endovenous ablation (MOCA) and Glue injections allow treatment of entire trunks with single anaesthetic injections. Previous non-randomized work has shown reduced pain post-operatively with these techniques. But the difference in pain perception of the same technique can vary between the patients a lot especially younger patient and patients with higher economic strata having more pain. To eliminate this bias we conducted a study between MOCA and RF ablation in patients with bilateral varicose veins with six months’ follow-up.

**Methods:** Patients with bilateral varicose veins underwent both MOCA and RFA under LA. Pain scores using Visual Analogue Scale were recorded. Patients were reviewed at one and six months with clinical scores, quality of life scores and duplex assessment.

**Results:** 20 patients were recruited over a 3-month. Patients in the MOCA group experienced less pain during the procedure Postoperative pain scores were similar in both groups. Occlusion rates, clinical severity scores, disease specific and generic quality of life scores were similar between groups at one and six months. The duration of the procedure was significantly less in MOCA group.

**Conclusions:** Pain secondary to truncal ablation is less painful with MOCA than RFA intraoperatively but similar in postoperative period. They have similar short-term technical, quality of life and safety outcomes.

Cryostripping as an alternative to endovascular approaches in the treatment of varicose veins

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**Background:** The presentation of cryostripping as an effective and cheap therapeutic method that we used in the cure of varicose veins.

**Methods:** This technique represents the modern alternative of saphenectomy through stripping procedure. It is done with the help of a special freezing probe introduced retrograde in the saphena magna or saphenectomy through striping procedure. It is done with the help of a special freezing probe introduced retrograde in the saphena magna or saphenectomy through striping procedure. It is done with the help of a special freezing probe introduced retrograde in the saphena magna or parva vein after performing the crossectomy by miniapproach. By freezing the vein with nitrogen up to -85°C the vein adheres to the probe and therefore it can be extracted.

**Results:** We introduced the method in September 09, 2013 and performed over 800 operations with good results. This procedure presents the advantage that through the vein ablation the risk of re-ermeabilization and recurrence disappears. There is minimum isisular trauma, therefore it can be used at the patients with philebo- lymphoedema of the lower limbs avoiding the postoperative cutaneous paresthesias through interrupting the saphenous nerve. From the economical point of view this method is very affordable due to the fact that the freezing probes can be resterilized. The patient can undergo this procedure in the surgical ambulatory conditions having a faster reintegration.

**Conclusions:** We consider the cryostripening a very valuable procedure that perfectly respects all the principles of the venous surgery.

Varicose vein worldwide trends in public digital interest

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**Background:** Varicose veins (VV) affect >30% of the population, globally VV treatment in 2024 is expected to cost 475,000,000USD. Technological advancements, growth in healthcare expenditure and population factors increasing the incidence of venous disease are driving the VV procedure market. The Internet has become a source of health-care information used by patients and physicians to research symptoms, diagnosis and treatments. Google is the most popular search engine for online health-related information. This study aimed to evaluate worldwide trends in patient VV research and treatment, using Google search behavior as a proxy.

**Methods:** Data from Google Trends on the worldwide topic VV over the last 10 years was analysed to identify changes in population search activity and thus interest in VV symptoms, recurrence and treatment. Sub-analysis by region was also performed.

**Results:** Interest in VV worldwide steadily increased by greater than 35%. Commonly associated search terms were surgery (75%), pregnancy (80%), pain (60%), alternative and non-operative treatments (10-20%) and laser (40%). An interest spike occurred May 2008 coinciding with an increase in VV medical literature publication. Search behavior exhibited a regular, cyclic pattern that was seasonal – higher in summer months, lower in winter. The most rapid increase has been in non-English searches for VV.

**Conclusions:** VV digital interest is consistent worldwide and increasing, particularly in developing countries. Cyclical interest is season related. While overall interest is steadily rising, traditional surgery remains the most commonly searched treatment choice, with interest in newer treatment techniques remaining stable.

Aesthetic ambulatory surgical therapy of the varicose veins: a 20-year experience

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**Background:** The aim of this paper is to present a particular ambulatory minimally invasive surgical method of treatment of the varicose veins. VANST (Vârstezi’s Ambulatory Non-stripping Surgical Therapy) is a procedure of taking the varicose veins out of the circuit through the interception of the channels of their filling up. Our experience in practicing this method is of over 13000 procedures.

**Methods:**
1. The marking on the skin of the places of the future incisions.
2. Steps of the intervention: - local anesthesia with 1% Lidocaine (10-20 ml) - incisions of 1-5 mm. - the varicose veins are intercepted, sectioned and ligated; the same procedure is applied for the insufficient perforant veins - in this manner both the venous flux and reflux are eliminated and the varicose veins are taken out of the circuit (they become just empty collapsed non-functional tubes) - a non-compressive bandage is applied.
3. The patient is immediately mobilized and leaves the clinic after 30 minutes.
4. Postoperative check-ups (after 24 hours, 7 days, 2 months and every 6 months).

**Results:** The closing-up of the varices takes place immediately in 100% of the cases. 5-year follow-up: recurrence after VANST occurs in 4.3% of the cases. VANST can be applied in a great variety of cases: truncular insufficiency of the GSV and of the SSV including the giant varicose veins, varicose veins complicated with lipodermatosclerosis or leg ulcer,
A comparison of adjunctive tributary laser ablation and foam sclerotherapy in patients undergoing truncal endovenous laser ablation for lower limb varicose veins

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Background: NICE guidelines recommended simultaneous treatment of varicose tributaries for patients undergoing truncal treatment, whilst lack of evidences should be recognized. This study compares outcomes of patients receiving simultaneous tributaries’ endovenous laser ablation (EVLA) or foam sclerotherapy (FS) with EVLA of great saphenous vein (GSV) trunk.

Methods: 418 patients (542 legs) with diagnosed varicose veins were recruited. Patients in EVLA/FS group (255 patients, 327 legs) received concomitant FS for the tributaries in the context of truncal lasering. For EVLA alone group (163 patients, 215 legs), tributaries (8W) were ablated with EVLA in addition to GSV trunk (14W). Complications, Aberdeen varicose vein questionnaire (AVVQ), EuroQol 5-dimension (EQ-5D), numerical rating scale (NRS) and condition of residual varicosities were assessed at 3 days, 4 weeks and 6 months after procedure. All residual varicosities were identified and eliminated with a staged FS.

Results: Except for ecchymosis, incidence of other complications was not significantly different between both groups at 6 months. Pain numerical rating score (NRS) of EVLA/FS group was remarkably elevated at 4 weeks, and then declined to a level comparable to EVLA alone group at 6 months. EVLA/FS group exhibited more significant improvement in both AVVQ and EQ-5D scales than EVLA group at 6 months, while having poor improvement at 4 weeks. EVLA/FS group had a significantly lower rate of residual varicosities than EVLA group, thus reducing the need for the staged FS.

Conclusions: These results confirm the feasibility and safety of simultaneous tributaries’ EVLA and FS, and indicate better early QoL improvement and a reduced reoperation rate of simultaneously combined truncal EVLA and tributaries’ FS.
SCLEROTHERAPY

Biomatrix sclerofoam: a coming option for leg vein treatment
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Background: Common sclerofoams (Cabrera type, including VariThera/BTG) are inferior to thermo-oclusion regarding primary and long-term results. A novel viscous microfoam using a biomatrix based on denatured autologous blood proteins now was evaluated in various targets.

Methods: In a prospective study, 85 patients (56 f, 29 m, 31 – 78 J.) were selected in bail-out situations to receive biomatrix sclerofoam (BSF) instead of standards. Targets (N.=230) were: 1. GSV including SFJ, 6 – 14 mm Ø, mean: 8.7 mm, N.=65; 2. SSV including SPJ, 6 – 11 mm Ø, mean: 7.2, N.=20; 3. Perforators, 4 – 11 mm Ø, mean: 6.9 mm, N.=43; 4. tributaries, 5 – 13 mm Ø, N.=64; 5. Recurrent varicosities 5 – 15 mm Ø, N.=38. The foam, prepared from 40% Aethoxysklerol 2%, 20% biomatrix and 40% gas, was deployed via catheter (PhleboCath, 2.0 – 2.3 mm Ø, or Microcath 1.6 mm Ø). Follow-up including ultrasound was performed after 2 weeks, 2 months and one year.

Results: Primary total occlusion of all segments intended to treat was obtained in 213/220 cases (96.9%). 7 targets (3.2%) required a second foam application (GSV: N.=1, tributaries: N.=2, perforators N.=2, recurrences N.=2). There were no complications, in particular no DVT. After one year, secondary reperfusion was observed: SFJ 3/65 cases (4.3%), GSV: 4/65 (6.2%), SSV: 1/20 (5.0%), tributaries: 6/64 (9.4%), perforators: 4/43 (9.3%), in recurrent varicosities: 4/38 (10.5%).

Conclusions: The novel foam is safe and effective for all major leg vein targets to occlude. Direct comparison to endovenous standards will follow.

Are all foams the same?
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Background: A review/overview of what parameters affect the quality of sclerosant foam in terms reproducibility, stability and bubble size and the clinical implications.

Methods: Foam was made using 3% and 1% sodium teradecyl sulphate and air using the Tessari method. An air to liquid ratio of 4 or 3 parts air and 1 part liquid were used. The time for a given volume of liquid to settle out of the foam was measured. Six non experts made seven replicates for each strength/liquid:air combination.

Bubbles size change over time was also measured for each combination.

Results: Bubble size increases with time but the brand of syringe can have a dramatic effect on bubble quality.

Air to liquid ratio has a large effect on stability with 4+1 being more stable than 3+1 liquid:air. The reproducibility is very good with little difference between replicates.

Conclusions: Physician made foam can be of excellent quality and is very reproducible. Syringes and or connectors can alter the foam properties significantly and a brand that makes foam that is stable for at least 60 seconds should be chosen.

Factors influencing recurrence after ultrasound-guided foam sclerotherapy for superficial venous insufficiency
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Background: We investigated factors influencing recanalization using near-infrared spectroscopy before and after ultrasound-guided foam sclerotherapy (UGFS).

Methods: Forty-eight limbs in 46 patients with great saphenous vein (GSV) reflux received foam sclerotherapy using 3% polidocanol-foam. Near-infrared spectroscopy (NIRS) was used to measure calf muscle oxygenated (O2Hb) and deoxygenated hemoglobin (HHb) levels before and 3 months after foam sclerotherapy. On standing, increases in O2Hb and HHb were calculated by subtracting the baseline value from the maximum value (ΔO2Hbst and ΔHHbst). The time elapsed until the maximum increases in O2Hb and HHb concentrations (TO2Hbst, and THHbst) were also measured. During 10 tiptoe movements, the relative change in O2Hb was calculated by subtracting the value measured at the end of exercise from the value measured at the beginning of exercise (ΔO2Hbex). On the other hand, 10 tiptoe movements produced venous expulsion (ΔHHbex) and a subsequent retention (ΔHHbRex). The oxygenation index (HbD; HbD=O2Hb-HHb) was also calculated at the end of standing and 10 tiptoe movements (ΔHbDex and ΔHbDext).

Results: Of 48 limbs evaluated, 12 patients developed recurrent varicose veins with a mean period of 10 months. There were no significant differences in the NIRS-derived parameters between patients with and without recurrence before UGFS. However, TO2Hbst was significantly reduced in patients who developed recurrent varicose veins compared to those who did not (67.8±33.9, 126.9±53.9 sec, P=0.0004). After calculating suitable cutoff point using receiver operating characteristic curves analysis, TO2Hbst<75 sec was found to be a predictor of recurrence (area under the ROC curve 0.78, 95% CI 0.64-0.89, P=0.0001). There were no significant differences in other parameter sat 3-month.

Conclusions: These findings suggest that TO2Hbst<75 sec measured by NIRS at 3-month predict recurrent varicose veins after UGFS. Measurement of these parameters by NIRS is simple and non-invasive, and was able to indicate functional improvement after UGFS in patients with superficial venous insufficiency.

Skin necrosis – an unpleasant reality of sclerotherapy (Czech Sodium Tetradecyl Sulfate – STS-study)
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Background: Skin necrosis can occur as a side effect of sclerotherapy after using practically any sclerosing agent (liquid of foam), on any vein diameter or localization and using whichever technique. In majority, the cause of its origin remains unknown. Several mechanisms are assumed.

Methods: 10.057 sclerotherapy treatments performed in CDA in Prague between November 2015 and June 2016 we performed and evaluated by our team of 4 experienced phlebologists with sclerotherapy practice of more than 15 years.

The study has an Ethic Approval from local Czech authorities

Results: In comparison to Australian Polidocanol Clinical Trial (skin necrosis in 0.34%), we found 0,21% when using STS. A detailed analysis of locations and concentrations of STS are presented.
Conclusions: Skin necrosis after sclerotherapy appears in a comparable rate in both most frequently used sclerotherapy agents (POL and STS). Informed consent of the patient regarding possible complications and adverse sequelae of sclerotherapy should be a standard as much as correct and immediate treatment.

Off-leg sclerotherapy
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Background: Patients infrequently request vein treatment on non-lower limb sites such as chest, dorsal hands and peri-orbital areas. Sclerotherapy remains a useful and safe non-surgical treatment method. This paper reviews non-surgical treatment options (sclerotherapy, lasers, adjunctive fillers) for non-lower limb veins.

Methods: (1) Pubmed literature search for “hand vein sclerotherapy”, “chest vein sclerotherapy” and “periorbital vein sclerotherapy”. (2) Clinical audit for non-lower limb veins treated with sclerotherapy and/or lasers for patients attending the author’s private practice over the period 2018 – 2017.

Results: Pubmed search uncovered 55, 28 and 7 citations for “hand vein sclerotherapy”, “chest vein sclerotherapy” and “periorbital vein sclerotherapy” respectively. Reports were typically of evidence level 4 (case series, case control studies) and level 5 (expert opinion).

Compression film bandage after leg vein sclerotherapy: two weeks versus four weeks wearing
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Background: Compression stockings or bandages are not suitable for continuous wearing. In spite of these media, results of sclerotherapy are often unsatisfactory, due to inflammations, residuals and stainings. A novel compression film bandage (CFB) now underwent evaluation of two weeks versus four weeks of wearing.

Methods: In this prospective and randomized study, 450 eligible legs with superficial varicosities, 5 - 16 mm Ø, mean 7.9 mm Ø (354 patients, 23 – 74 yr/o) were included in the study. CFB (prototype 3M/Venartis Inc.) was applied immediately after foam sclerotherapy and worn continuously. Randomization: 6 groups with equal diameter distribution (+/- 0.3 mm): CFB for 14 or 28 days with a renewal after 14 d, CFB plus compression stocking German class 2 for 14 or 28 days day over, and continuous wearing. In spite of these media, results of sclerotherapy are often unsatisfactory, due to inflammations, residuals and stainings. A novel compression film bandage (CFB) now underwent evaluation of two weeks versus four weeks of wearing.

Results: During follow-up, symptomatic inflammations, residuals/induration or stainings were observed in the compression stocking group in 62.5% (14 d) versus 51.3% (28 d). When using CFB combined with compression stockings, symptoms were reduced to 9.3% (14 d) versus 4.7% (28 d), and 12.3% (14 d) versus 6.8% (28 d) for CFB alone. More than 80% of the cases contributing to the differences were larger than 10 mm in diameter.

Conclusions: Four weeks of CFB wearing are more effective in achieving symptom-free vein regression than two weeks. The benefit was in particular relevant for target vein diameters above 10 mm.
DEEP VENOUS OBSTRUCTION AND RECONSTRUCTION

Endovascular treatment of May-Thurner syndrome
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Background: May-Thurner syndrome represents compression of the left iliac vein from the right iliac artery causing disturbed venous drainage leading to chronic venous insufficiency (CVI)- edema, varicose veins and discomfort in lower limbs. It is a high risk factor for deep vein thrombosis (DVT). Timely exact diagnosis and endovascular treatment can prevent DVT and relieve the symptoms of CVI.

Methods: To evaluate vascular and clinical results of exact diagnosis and endovascular treatment of patients with May-Thurner syndrome. Material and methods: in the period 2012-2017 29 patients (25 females) were diagnosed with May-Thurner syndrome including 9 (31%) with CVI and 20 (69%) with postthrombotic syndrome; Venous stenosis were established using EchoDoppler, CT phlebography and conventional phlebography. In all patients endovascular therapy was performed including balloon angioplasty or stenting

Results: The diagnosis of a May-Thurner syndrome was confirmed with conventional angiography and phlebography. In all of the patients stenting of the left iliac vein was performed. Due to bilateral compression in 3 patients we implanted stents on the right iliac vein, as well (kissing stents). No significant complications were registered. The patients received continuous antiplatelet and anticoagulant therapy. We established 100% success rate in early and late results on 6th and 12th month respectively regarding stent patency and clinical improvements.

Conclusions: May-Thurner syndrome may be successfully diagnosed by color Echo Doppler, CT and conventional phlebography in patients symptomatic for venous compression syndrome. Implanting of a venous stent in the iliac vein is remarkable with high success rate, removes the compression, improves the venous insufficiency and prevents the development of DVT.

Intraoperative evaluation of Iliac Vein Compression syndrome (IVCS) by IVUS and comparison with venogram
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Background: To investigate the sensitivity of IVUS in evaluation of IVCS before and after treatment and compare it with venogram. Methods: IVCS before and after treatment and compare it with venogram. Background: It is a high risk factor for deep vein thrombosis (DVT). Timely exact diagnosis and endovascular treatment can prevent DVT and relieve the symptoms of CVI.

Methods: To evaluate vascular and clinical results of exact diagnosis and endovascular treatment of patients with May-Thurner syndrome. Material and methods: in the period 2012-2017 29 patients (25 females) were diagnosed with May-Thurner syndrome including 9 (31%) with CVI and 20 (69%) with postthrombotic syndrome; Venous stenosis were established using EchoDoppler, CT phlebography and conventional phlebography. In all patients endovascular therapy was performed including balloon angioplasty or stenting

Results: The diagnosis of a May-Thurner syndrome was confirmed with conventional angiography and phlebography. In all of the patients stenting of the left iliac vein was performed. Due to bilateral compression in 3 patients we implanted stents on the right iliac vein, as well (kissing stents). No significant complications were registered. The patients received continuous antiplatelet and anticoagulant therapy. We established 100% success rate in early and late results on 6th and 12th month respectively regarding stent patency and clinical improvements.

Conclusions: May-Thurner syndrome may be successfully diagnosed by color Echo Doppler, CT and conventional phlebography in patients symptomatic for venous compression syndrome. Implanting of a venous stent in the iliac vein is remarkable with high success rate, removes the compression, improves the venous insufficiency and prevents the development of DVT.

Comparison of the surgical and conservative treatment of the popliteal vein entrapment (compression) syndrome
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Background: The treatment of popliteal vein entrapment syndrome (PVES) is still controversial with several choices for treatment. The surgical method and the conservative method were compared.

Methods: Between 2007 and 2017, 8 patients (all female, mean age 41), 12 limbs have been observed and treated conservatively for PVES. Diagnostic criteria included calf ache, swelling and tenderness of the popliteal fossa and a positive result on a passive dorsiflexion test, showing compression of the popliteal vein on venography or echography, and a hypertrophied, aberrant, or laterally-shifted medial head of the gastrocnemius muscle on MRI. Four limbs showed popliteal or soleus muscle vein thrombosis. Conservative treatment included reduction of body weight, decreasing the standing work time, walking pigeon-toed, using high-heeled shoes, and trigger point block with xylcocaine. Anticoagulant therapy was added for the thrombosed cases.

Results: During years 1-8 of follow-up, 8 limbs, 67%, were improved and 33% were unchanged when the patients returned to their former lives. Four vein thrombosis became localized and fibrous. A comparison and a positive result on a passive dorsiflexion test, showing compression of the popliteal vein on venography or echography, and a hypertrophied, aberrant, or laterally-shifted medial head of the gastrocnemius muscle on MRI. Four limbs showed popliteal or soleus muscle vein thrombosis. Conservative treatment included reduction of body weight, decreasing the standing work time, walking pigeon-toed, using high-heeled shoes, and trigger point block with xylcocaine. Anticoagulant therapy was added for the thrombosed cases.

Conclusions: Surgical treatment is highly beneficial in severe symptomatic cases. Others are treated conservatively first, at least for several months. The development of popliteal vein thrombosis will be carefully followed.

Risk factors for and causes of thrombosis complicated by stent implantation for iliac vein compression: a retrospective analysis of a large cohort
Wen-Dong Li, Xiao-Qiang Li
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Background: To explore the risk factors for and causes of thrombosis after stent implantation for iliac vein compression (IVCS).

Methods: A retrospective analysis of 1031 patients with IVCS was performed to identify risk factors for thrombosis in stent or contralateral deep vein. The images of the recurrent patients during follow-up dura-
Transabdominal ultrasound can be a reliable screening tool for May-Thurner syndrome and other iliac vein lesions using a dedicated criteria

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Background: May-Thurner syndrome and other iliac vein lesions are increasingly recognized as important contributors in the development of Chronic Venous Insufficiency, Deep Venous Thrombosis and Pelvic Congestion syndrome. It is widely believed that ultrasound has significant limitations when visualising abnormalities in the iliac veins due to their deep location in the abdomen. We postulated that, in the hands of experienced operators and using the comprehensive criteria described in this paper, transabdominal duplex ultrasound can and should be used as a reliable and cost effective first-line imaging study when screening for May-Thurner syndrome and other Iliac Vein Lesions. In this study we focused on assessing the accuracy of the described transabdominal ultrasound criteria by validating the results using 3-D multi-planar venography.

Methods: We prospectively designed a comprehensive criterion for identifying Iliac Vein Lesions on transabdominal ultrasound by focusing on vein diameters. We applied the diagnostic criteria to 433 patients between April 2016 and April 2017. A subgroup of severely symptomatic patients, referred to a vascular specialist, were then offered 3-D multi-planar diagnostic venography and the results between the two methods were compared. Selected cases also had pressure measurements and intravascular ultrasound imaging.

Results: During the 12 month period 194 of the 433 patients screened were found to have iliac vein obstructive lesions (44.8%). Seventy five patients then underwent 3-D multi-planar diagnostic venography. Agreement between transabdominal ultrasound and venography was found to be 97.1% when the described criterion was used.

Conclusions: Transabdominal ultrasound using a dedicated criterion with reduced vessel diameter as the main indicator of pathology can be a reliable, non-invasive, highly accessible screening tool for Iliac Vein Lesions or May–Thurner syndrome and should be included as part of a complete assessment for patients presenting with venous insufficiency or pelvic congestion symptoms.

Whole progress management of acute iliofemoral venous thrombotic disease treated by AngioJet® combined with Wallstent®

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Background: The purpose of this study was to objectively assess the treatment effect and safety of AngioJet® combined with Wallstent® in acute iliofemoral vein thrombosis treatment under the protection of inferior vena cava (IVC) filter.

Methods: 45 patients with acute iliofemoral vein thrombosis combined with iliac vein compression syndrome (IVCS) during January 2015 and June 2016 were enrolled. Clinical records of all patients were evaluated. Stent patency was assessed using duplex ultrasound. Clinical outcomes were evaluated using a clinical symptom score (Villalta) and the revised venous clinical severity score (rVCSS) at 3, 6, 12 and 24 months in follow-up.

Results: Primary treatment success was achieved in all patients. Mean follow-up was 26±5 months. Primary patency estimates by Kaplan-Meier analysis were 97% at 6 months, 91% at 12 months, and 82% at 24 months. Seven symptomatic patients underwent reintervention for early and late stent thromboses or in-stent restenosis. At the latest follow-up, 71% reported complete resolution of symptoms. The Villalta score decreased by 5±4 points (P=0.04) and the rVCSS score by 3±2 points (P=0.05).

Conclusions: In patients with acute iliofemoral vein thrombosis and IVCS, stent implantation to solve the residual obstruction after Angiujet might play an important role in preventing PTS.

Intravenous leiomyomatosis of the inferior vena cava revisited: an experience of 8 cases

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Background: To summarize the experience on the diagnosis and therapy of IVL of the inferior vena cava.

Methods: Clinical data were retrospectively analysed with eight IVL of the inferior vena cava patients in our hospital from 2009 to 2017.

Results: The patients were ranged from 35 to 56 yr (mean: 45.9 yr). Six cases were hospitalized due to lesions in the inferior vena cava examined by ultrasound or CT, the other were found when the right atrial space occupying lesions were being treated. three cases invaded to the right atrium, four to the posterior hepatic vein, one to the renal vein level. All patients underwent surgical treatment, two cases of right atrium invaded were treated with staged operation, bilateral ovarian and accessory resection was performed in five patients, unilateral resection in two and bilateral ovaries were reserved in one; the tumor was resected with the help of transesophageal echocardiography in two cases. One case developed deep vein thrombosis and was cured after anticoagulation therapy, no serious complications occur in others. Intravenous leiomyoma was suggested in pathology. One case suffered recurrence after 1year, the remaining cases without recurrence.

Conclusions: Bilateral ovarian and accessories should be resected for reducing the estrogen level and further avoiding the recurrence. Staged surgery is more safety when the lesion involves right atrium, the resection of the tumor can be safer and more accurate under the transesophageal echocardiography. Total surgical extirpation of the tumor is the only effective treatment for this disease and have good prognosis.
Deep venous valve reconstruction: femoral transposition and neovalve
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Background: Because of the complexity of the procedures, deep venous surgery is challenging, performed in only a small number of centers, and the outcomes remain controversial. The purpose of this paper was to report our first case series and the outcomes of the deep venous surgery in the patients with deep venous insufficiency (DVI).

Methods: The indications for the deep venous surgery were the patients who had DVI and persistent active ulcers even after the compression treatment, the suppression of superficial reflux and perforator insufficiency, and endovascular iliac vein stenting. From July 2013 to April 2017, the deep venous surgery was performed on 14 patients (5 femoral transposition and 10 neovalve). We performed the femoral vein transposition if the ipsilateral great saphenous vein has a proximal competent valve and adequate caliber. The neovalve procedure was carried out if the superficial reflux and perforator insufficiency had been suppressed previously.

Results: Ulcer healing was observed in all 15 limbs within 2 and 12 weeks after the surgery (median, 6.6 weeks) with one recurrent symptom with a mean follow-up of 25 months (range, 5-46 month). Postoperative evaluations (descending venography and duplex scanning) were performed, and showed that 1/15 had occurred at 1 month after the neovalve operation, and the remaining 14 were still patent at the last follow-up.

Conclusions: Although the numbers were too small to analyze the outcomes, our experience demonstrates both the feasibility and effectiveness of the reconstructive deep venous surgery for the recalcitrant venous ulcers.

Iliac vein compression syndrome in an asymptomatic patient population and follow with visit in 3 years. A prospective study
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Background: The purpose of this prospective study was to determine the incidence of IVCS in an asymptomatic patient population and to evaluate for risk factors in patients with and without IVCS.

Methods: From October 2011 to November 2012, a total of 500 patients with no vascular related symptoms were enrolled in this study. We compared the stenosis rate of the common iliac vein in women and men according to age and followed-up patients to evaluate outcomes.

Results: The mean compression degree of the left common iliac vein (LCIV) was 16% (4%, 36%); 37.8% of patients had a compression degree ≥25% and 9.8% had a compression degree ≥50%. There was a significant difference between men and women in the LCIV compression degree (9% [3%, 30%] vs. 24% [8%, 42%]; U=4.66, P<0.01). In addition, the LCIV compression degree among younger women was significantly different compared with that in middle aged women (42% [31%, 50%] vs. 19% [5%, 39%]; U=5.14, P<0.001). Follow-up was completed in 367 patients with a mean follow-up of 39.5 months (range, 6-56 months). Multivariable Cox regression analysis showed that the stenosis rate was an independent risk factor of IVCS.

Conclusions: The incidence of IVCS was low and correlated with the stenosis rate of iliac vein. Preventative therapy may be warranted for common iliac vein compression in patients at an increased risk of venous thromboembolism, especially patients with a higher iliac vein compression degree.

Intravascular ultrasound (IVUS) guided stenting of the common iliac vein
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Background: Common iliac vein stenosis are complex, long and diffuse. The fibrotic sleeve that envelops long segments of the iliac vein produces stenosis and occlusion. Intravascular ultrasound (IVUS) provides a convenient way to identify and to treat this lesion with IVUS-guided stent placement.

Methods: The analyses are derived from medical records and cases of 15 iliac vein stent procedures performed from 2015 to 2017. We performed a detailed intravascular ultrasound planimetry and description.

Results: Patients with highly symptomatic chronic venous disease resistant to conservative therapy were treated with IVUS-guided stent placement. The incidence of long and complex lesions was 86%, only 14% had focal lesions. After POBA, stenotic area increased from a median of 58 mm2 to 64 mm2. Lumen area increased to 160 mm2 after stent placement.

Conclusions: The lesion extension is easily missed with conventional diagnostic techniques and may not be recognizable even with venography, unless intravascular ultrasound is used. POBA as a primary treatment invariably fails to correct focal or diffuse iliac vein stenosis, and stenting is always required. The degree of stenosis (percentage stenosis) was based on area measurements, not diameter. The IVUS guided stenting permits the proper measure and deployment of the stent in the common iliac vein.

Endovenous ablation of leg veins: should we be more or less radical
Alexander Flor

In phlebology we will always discuss if we should use a technique more radical or less radical. We were educated that every patient’s Vena Saphena Magna (Parva) needs to be stripped over the whole length with access through big incisions in the groin or in the poplitea. Then came miniphlebectomy in the seventies, scientifically described nowadays in the ASVAL technique, no Crosssectomy, no stripping anymore. Using Endolaser in our clinic since 2001 we realized that one big advantage of the Endolaser is that due to the possibility of multiple punctures someone could treat just insufficient vein segments, and spare healthy vein segments. For example: treating less truncal veins in the lower leg, because they are of normal size, no reflux. Or not treating the greater saphenous vein distal of the distal point of insufficiency in Hach 2-3 varicosity, when the insufficient vessel is a vein parallel to the greater saphenous vein yet direct below the skin. Yet we have to realize that in some patients or in some anatomic situations this concept might end up in a higher rate of recurrence. In the presentation some situations are presented in which a more radical, even prophylactic use of the Endolaser might be advisable.
The Swiss registry of Thermic Endovenous Catheter Therapy (Swiss TECT Registry) in varicose veins. A multicenter case study

Christina Jeanneret-Gris

Background: The aim of the study was, to assess the efficacy and safety of thermic endovenous catheter therapy (TECT) in patients with varicose veins.

Methods: All physicians of the Swiss Society of Phlebology, performing TECT (such as Lasertherapy or Radiofrequency ablation) were asked to participate in a central register. 13 of 22 initiated centers are active since. 2 centers never included patients for unknown reason and 7 centers participate in a central register. 13 of 22 initiated centers are active since.

Results: Total of 68 females and 38 males with a mean age of 49.4±11.5 years presented for follow-up review. The number of limbs was 180 including 208 incompetent venous trunks (GSV-170/SSV-37/AIV-1). Patients underwent clinical assessment and comprehensive duplex venous incompetence study. Mean follow-up time was 42.1±20.1 months. Visible disease progression at time of review was apparent in 31 patients (29.2%). Recanalization/Recurrence/Failure within the duration was apparent in 16 limbs (8.9%) (F=10/M=6). 27 patients (25%) presented some form of neo-incompetence in 31 trunks. Patients with truncal recanalization had BMI=30±kg/m2.

Conclusions: The group who underwent follow-up is heterogeneous and possibly motivated, therefore impacted by "self-selection" bias. The rate of recanalization after the 3 year period is higher than reported in the existing literature. Increased BMI was found to be a constant and appears to be a contributing factor to truncal recanalization. Further investigation is required. It might be necessary to have a specialized minimally invasive treatment protocol for patients with high BMI undergoing EFA.

ClosureFast Endovenous Radiofrequency Ablation (ERFA) for GSV-SSV incompetence. Efficacy and failure patterns. A 3 years follow-up – the Australian experience

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Background: Recurrence and its patterns after open surgery and stripping are well documented; however, not much is reported on long-term results after endovenous radiofrequency ablation (ERFA). Thus this study was designed to address those questions after a 3 years follow-up.

Methods: 200 patients who were close to complete or had completed 3 years post treatment for venous incompetence were invited to return for assessment as part of an ongoing observational study. 106 patients responded and returned for review.

Results: A total of 68 females and 38 males with a mean age of 49.4±11.5 years presented for follow-up review. The number of limbs was 180 including 208 incompetent venous trunks (GSV-170/SSV-37/AIV-1). Patients underwent clinical assessment and comprehensive duplex venous incompetence study. Mean follow-up time was 42.1±20.1 months. Visible disease progression at time of review was apparent in 31 patients (29.2%). Recanalization/Recurrence/Failure within the duration was apparent in 16 limbs (8.9%) (F=10/M=6). 27 patients (25%) presented some form of neo-incompetence in 31 trunks. Patients with truncal recanalization had BMI=30±kg/m2.

Conclusions: The group who underwent follow-up is heterogeneous and possibly motivated, therefore impacted by "self-selection" bias. The rate of recanalization after the 3 year period is higher than reported in the existing literature. Increased BMI was found to be a constant and appears to be a contributing factor to truncal recanalization. Further investigation is required. It might be necessary to have a specialized minimally invasive treatment protocol for patients with high BMI undergoing EFA.

Venous distension in patients with aneurysmatic arterial disease compared to the venous distension in patients with arterial occlusive disease and to healthy controls

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Background: The aim of the study was to assess venous distensibility in patients with aneurysmatic arterial disease (AAD) compared to venous distensibility in patients with peripheral arterial occlusive disease (PAOD) and in healthy subjects (HS).

Methods: Measurements were carried out in 150 legs of 79 patients (27 AAD, 26 PAOD, 26 HS). The aortic diameter in Patient with AAD had to be ≥3 cm, for the popliteal artery aneurysm a diameter of ≥1.5 cm was mandatory. Patients with arterial occlusive disease (PAOD) were included if their ankle brachial index (ABI) was <0.9. Venous diameter was measured in the right CFV, the femoral vein (FV) and the great saphenous vein (GSV) in 3'806 treated legs (86%). 11 venous thrombosis were found in the distal veins. The non-occlusion rates at one week and one year were 3.3% (110/3806) and 3.6% (79/2'136 veins). The rate of recanalization was apparent in 16 limbs (8.9%) (F=10/M=6). 27 patients (25%) presented some form of neo-incompetence in 31 trunks. Patients with truncal recanalization had BMI=30±kg/m2.

Conclusions: This registry shows a low complications rate with 0.86% venous thromboembolism, however one central pulmonary embolism occurred. The occlusion rate of 96.7% after one year is comparable with those published in the literature. Recurrence rate over the years has to be assessed in the future.

Relative venous diameter differences were significantly larger in the CFV, the GSV and the FV in the AAD-group compared to the PAOD-group and compared to HS. The relative median (IQR) venous diameters (%) measured in the right CFV of the patients in the AAD-, PAOD- and HC group amounted to 30.5 (16.5), 19.2 (13.4) and 19.8 (10.0), respectively (P AAD vs. HC=0.0001, P PAOD vs. HC=0.51). The absolute and relative venous diameter differences (VD diff and VD diff %) were measured. Relative venous diameter difference in % was the quotient of venous diameter difference and maximal venous diameter.

Results: Relative venous diameter (VD) differences were significantly larger in the CFV, the GSV and the FV in the AAD-group compared to the PAOD-group and compared to HS. The relative median (IQR) venous diameters (%) measured in the right CFV of the patients in the AAD-, PAOD- and HC group amounted to 30.5 (16.5), 19.2 (13.4) and 19.8 (10.0), respectively (P AAD vs. HC=0.0001, P PAOD vs. HC=0.51). For the FV, median (IQR) VD in % for the AAD-, PAOD- and HC group were: 27.5 (9.6), 13.8 (11.1) and 12.3 (11.9), respectively (P AAD vs. HC=0.0001, P PAOD vs. HC=0.51). The relative median (IQR) VD
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- wall weakness in patients with AAD affecting not only the arterial
to patients with PAOD and compared to HC. The venous distensibility
does not differ between HC and patients with PAOD. We assume a ves-
- The novel minimally invasive mechano-chemical method of
- is aimed at looking ways to decrease sequential reinterventions and in-
crease patient’s early cosmetic satisfaction after GSV ablation.

Methods: We studied on 107 patients with primary varicose veins
between 2014-2016. All had SFJ and GSV incompetence plus visible
tributaries. Two groups identified: Group A, who had undergone RF
ablation plus staged phlebectomy or sclerotherapy. Group B, who had un-
dergone one step RF ablation plus phlebectomy. Patient’s early cosmetic
satisfaction and number of procedures needed to treat residual tributaries
recorded in a 6 month period.

Results: Group A: 42% (24 in 57) of legs in RF-only group needed ad-
tional treatment on residual tributaries, in 6mo follow-up. In group B: 7.5%(4 in 55) of legs in RF-phlebectomy group needed further
therapy, in 6mo follow-up. Complications were minimal and comparable
in both groups. Cosmetic results were more satisfying in group B.

Conclusions: Concomitant GSV ablation and phlebectomy is an accept-
able procedure with minimal complications. Advantages are early pa-
tient satisfaction and reduced number of subsequent interventions.

The novel minimally invasive mechano-chemical method of
the saphenous vein ablation. One center experience - results
of 12 months follow-up

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Background: Over the years chronic venous insufficiency (CVI) and its
aftermath are still considered as a serious medical problem, being sig-
nificant financial burden for the patients as well as for the entire society.

Objective - The aim of the study was evaluation of the clinical efficacy
novel method mechano-chemical ablation of the saphenous vein with
usage Flebogri™ catheter. The re-canalization rate, total volume obliter-
ation agent usage, possible complications, cosmetic results, method
effectiveness in case of veins above 8mm in diameter.

Methods: 200 patients were treated (Great Saphenous Vein, Small Sa-
phenous Vein) with the use of Flebogri™. CEAP and VCSS (Venous
Clinical Severity Score) scales were used to assess CVI symptoms in
different time frames. Follow-up visits were set as follows: 1, 3, 6, and
12 month post-op.

Results: After 12-month-period, statistical analysis was performed with
the use Wilcoxon and Friedmann’s tests. Statistically significant decrease
in the clinical symptoms in the measured time points were noted (0-4;
4-6; 6-12 months). The efficacy of Flebogri™ was assessed to 92%.

Conclusions: High rate of success (92%), low number of complication,
very good cosmetics effect. For fully evaluation Flebogri catheter longer
time of follow-up is required

Comparison between foam sclerosis, radiofrequency and laser in the treatment of large varicose veins in Mexico

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Background: The most frequent problem associated is saphenophemor-
nal reflux. Surgery continues to be the gold standard for the treatment.
In the last 15 years various minimally invasive procedures have been intro-
duces to treat saphenofemoral reflux. The most frequent in our country
are endovenous laser ablation (EVLA), radiofrequency ablation (RFA),
and ultrasound guided foam sclerosis (USGFS).

Methods: We made a comparison between these three modalities of
treatment in our country. We reviewed three different non-randomized
groups of patients. All of the patients needed treatment for saphenofemo-
ral reflux. We followed the patients for 18 months post procedure. CEAP
classification was made for each and everyone of the patients. The pa-
tients were evaluated for total closure of the SFJ, changes in the QOL
scale, postoperative pain score at postop day three, associated morbidi-
ties, and cost of the procedures.

Results: We performed the study between january 2010 and march
2017. EVLA group comprised 129 patients, RFA group comprised
117 patients, USGFS comprised 152 patients. Of the 398 total of pa-
tients,(223) were female and (175) were male, average age 57 years. All
patients were examined with duplex scan before the procedure and at 15
days postop, 30 days postop, 6 months and 12 months. CEAP average in
the EVLA group was 4.7, in the RFA group was 3.7, and in the USGFS
was 4.2. Total closure at 15 days postop was as follows for each group;
EVLA 92.5% of patients, RFA 91.8%, and USGFS 84.25%. At 30 days
postop the total closure rate for all three groups was EVLA 84.25%, RFA
90.81%, and USGFS 81.88%. At 12 months total closure rate was EVLA
83.3%, RFA 87.7%, and USGFS 77.16%. We measured QOL by CIVIQ
questionnaire average for the 3 groups were as follows; EVLA 67, RFA 63,
USGFS 74, at 6 weeks postop results were EVLA 79, RFA 81, USGFS
82. Postoperative pain measured by visual analogue scale at three postop
day was EVLA 6, RFA 5, USGFS 3.

Conclusions: New minimally invasive procedures are an excellent op-
tion in our country to treat patients with SFJ reflux with less morbidity
and atletas the same rates of closure as the gold standard procedure.

Current status and progress in primary lower extremity var-
icose veins care

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Background: To generally analyse the current situations and advances
in the primary lower extremity varicose vein care.

Methods: Electronic databases including Medline, PubMed, Cochrane
Library and three Chinese databases were searched with key words of
“varicose veins”, “lower limb” and “care”. We considered studies about
Primary lower extremity varicose veins care, randomized controlled tri-
Complications were registered. The AVVQ scores were reduced from 26 down to 12 and 17 respectively (P<.0001). The VCSS was similarly reduced from 7 to 3 at both follow-ups (P<.0001). A majority of patients was satisfied with the overall long term result (66%). After one year 80% were free from duplex detected groin recurrence and the figure after 69 months was 59%. The 41% with incompetence was mostly caused by neovascularization although three also had returning stumps.

Conclusions: This audit shows that medial open surgical treatment of remaining saphenous stumps seems to be a valid treatment option that previously has been considered difficult to perform. In a time when more and more stump recurrences are reported after endovenous treatments this technique can become a valuable tool to deal with these recurrences.

Long-term results from medial re-do groin surgery
Olle Nelzén

Background: How to deal with varicose vein recurrence especially regarding groin recurrence has hardly been studied scientifically. This audit was performed to assess, long term, a new medial open surgical approach to deal with groin recurrence in the form of remnant incompetent saphenous stumps.

Methods: In an audit regarding varicose vein interventions at our institution, Sept. 2009 - Aug. 2010, 33/252 interventions were groin recurrence operated by a medial approach by several surgeons. The operating time was 69 minutes in median (35-120). Follow-up with colour duplex was performed after 4-6 weeks, 1 year and after more than 5 years. Quality of life was assessed by the Aberdeen Varicose Vein Questionaire (AVVQ) answered by the patients before and 1 and 5 years following the surgery. Varicose Vein Severity Score (VCSS) was also assessed before surgery and after by independent observers. The patients views on the result were also registered.

Results: The total follow-up for 22/33 patients (67%) was 69 months (39-75). 30/33 (91%) were followed for at least one year. No serious complications were registered. The AVVQ scores were reduced from 26 down to 12 and 17 respectively (P<.0001). The VCSS was similarly reduced from 7 to 3 at both follow-ups (P<.0001). A majority of patients was satisfied with the overall long term result (66%). After one year 80% were free from duplex detected groin recurrence and the figure after 69 months was 59%. The 41% with incompetence was mostly caused by neovascularization although three also had returning stumps.

Conclusions: This audit shows that medial open surgical treatment of remaining saphenous stumps seems to be a valid treatment option that previously has been considered difficult to perform. In a time when more and more stump recurrences are reported after endovenous treatments this technique can become a valuable tool to deal with these recurrences.

Humanitarian varicose vein treatments in Central and South America: a personal journey
Stefania Roberts1, Miguel Angel Huaman Rios2

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Untreated sequelae of chronic venous insufficiency leads to impairment on quality of life and ability to work. Central and South America have decreased access for their patients to obtain any treatment for their chronic venous disease.

Over the past two years we have been part of a Humanitarian Mission in Matapalga, Nicaragua lead by Dr Nick Morrison as the Amigos de Salud (friends of health). Here a group of doctors from the USA, Canada, UK, Italy, Argentina and Australia work conjointly with vascular sonographers, nurses and any extra hands that will volunteer their time to assess, treat and manage patient’s in the region. We treat patient’s with compression garments, lymphatic drainage, endovenous laser ablation, radiofrequency ablation, Venaseal and Ultrasound Guided Sclerotherapy to improve the health of their lower limbs. This year Dr Huaman, myself and two doctors from Australia will be working as the Austral Humanitarian Mission in Tucuman, Argentina to assess and treat patient’s venous insufficiency via compression stockings, endovenous laser ablation, radiofrequency ablation, Venablock, Veinoff and ultrasound guided sclerotherapy.

Giving up one’s time to give back to humanity is priceless. A big thank you to trade for donating Venosan stockings, laser fibers, radiofrequency devices, sclerosants and cyanoacrylate to make this possible.
**BASIC SCIENCE**

**Metabolic phenotyping of chronic venous disease**
Sarah Onida1, Richmond Bergner2, Hannah Lees3, Joseph Shalhoub1, Elaine Holmes2, Alun Huw Davies1
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**Background:** Chronic venous disease (CVD) is a common condition with an important clinical and socio-economic burden. Much is unknown about the biological pathways involved in disease development and progression. The aim of this work was to characterize the metabolic phenotype of CVD patients compared to healthy volunteers and explore the correlation across CEAP class.

**Methods:** Participants were recruited from a single center (October 2014–June 2016). Ethical approval was obtained for recruitment of both patients and controls (REC reference 13/EM/0011). Individuals with clinical symptoms of CVD scheduled for intervention and symptomatic individuals were invited to participate. Serum and urine samples were collected and subjected to nuclear magnetic resonance spectroscopy experiments. Multi- and univariate statistical techniques were employed in data analysis.

**Results:** 517 individuals with CVD and 105 healthy volunteers were recruited. Age and CEAP classification were the most statistically significant models on multivariate analysis; a regression analysis was performed for the most significant metabolites across the CEAP spectrum. Serum metabolites positively correlating with CEP included: 1-methylhistidine, phenylalanine, tyrosine, glycerol, lysine and succinate. There was a negative correlation between urinary metabolites and increasing CEAP class. Statistically significant trends were identified for formate, creatinine, glycine, citrate, succinate, pyruvate and α-hydroxyisobutyrate.

**Conclusions:** Identified metabolites are relevant to the tricarboxylic acid cycle for energy metabolism, hypoxia inducible factor pathway and the one-carbon metabolism. This suggests increased energy metabolism in higher CEAP classes (C4–6), which may be due to increased CVD severity, although the possibility that this is due to cutaneous effects of CVD cannot be ruled out. This work has important translational potential with respect to diagnostic, prognostic and therapeutic applications in CVD.

**Detergent sclerosants induce cellular apoptosis**
Osvaldo Alfredo Cooley Andrade, David Connor, Kurosh Parsi
Dermatology, Phlebology and Fluid Mechanics, St. Vincent’s Center for Applied Medical Research, Sydney, Australia

**Background:** To investigate the effects of detergent sclerosants sodium tetradeyl sulphate (STS) and polidocanol (POL) on human leukocytes and endothelial cells at sub-lytic concentrations.

**Methods:** Human Umbilical Vein Endothelial Cells and human leukocytes were labelled with antibodies to assess for apoptosis and oncrosis by fluorescence microscopy and flow cytometry. Cell viability and membrane integrity were assessed using trypan blue, fluo-3 and propidium iodide (PI) staining. Phosphatidylserine (PS) exposure (apoptosis) was identified by flow cytometry using lactadherin. Caspase 8 expression was used as a marker of the extrinsic pathway of apoptosis and Bax for the intrinsic pathway. Porimin expression was used to assess oncrosis.

**Results:** Up to 40% of leukocytes and endothelial cells maintained membrane integrity at sub-lytic concentrations (≤0.15%) of sclerosants. The remaining 60% did not maintain membrane integrity but were not completely lysed. PS exposure was increased with both STS and POL exhibiting a dose- and time-dependent trend. Expression of both Caspase 8 and Bax was increased in both leukocytes and endothelial cells treated with STS while those exposed to POL expressed increased Bax only. Both agents increased the leucocyte expression of porimin at 0.075%. On fluorescence microscopy, stains for Caspase 8 and Bax were slightly increased for STS and only Bax was increased for POL. Poromin stain was markedly positive for both STS and POL.

**Conclusions:** Both sclerosants induced leukocyte and endothelial cell apoptosis and oncrosis at sub-lytic concentrations. STS activated both extrinsic and intrinsic pathways of apoptosis while POL stimulated the intrinsic pathway of apoptosis only. Both agents stimulated the poromin pathway of oncrosis.

**Persistent aggregates at the valve sinus are different from sludge or thrombus. A pilot study on description and potential reversibility**
Johann Chris Ragg
Angiolinkin Vein Centers, Berlin, Germany

**Background:** Background: Using novel high resolution ultrasound systems (HRU), valvular structures and low-flow microaggregates may be depicted today in a more detailed way. This study examines the appearance of temporary and permanent blood particle aggregations.

**Methods:** 60 patients (41 f, 19 m; 32–58 yr old) were included, representing 3 groups of professions with >6 hours of daily sitting (N.=20), >6 hours of daily standing (N.=20) and cases with less than 2 h of sitting or standing during work. All underwent HRU (8–16 MHz, peak up to 40 MHz, Veo MD). A total of 120 well described GSV vein valves, all without reflux, were selected for this study. Persistent microaggregates (PMA), defined as blood particle aggregates not dissolving during any movements, were registered. Two subgroups were examined for changes of PMA during 3 months of newly started wearing of compression stockings, or flavonoid medication (Daflon 500).

**Results:** Persistent microaggregates were found in 47/120 “healthy” vein valves (39.1%). They were much more frequent in valves of subjects sitting or standing professions (73/80; 91.3%, versus 10/20, 50.0%). In a subgroup receiving compression stockings, 21/26 of examined valves showed reduction of PMA (80.8%), in the second subgroup receiving flavonoid medication reduction of PMA was seen in 9/13 valves (69.2%).

**Conclusions:** Persistent blood cell aggregates at the valve sinus seem to be associated with lifestyles including long periods of decreased or stagnant flow. The criterion of PMA may potentially be used in future for the evaluation of benefits of compression device, physical activity or medication. The study will be continued, adding histology and cytology.

**Microscopic examination of scleroagulum: what is trapped blood?**
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**Background:** The aim of this study was to determine the microscopic characteristics and structural composition of ex-vivo coagulum/trapped blood post-sclerotherapy.

**Methods:** Coagulum/trapped blood was identified and extracted with a 20mL syringe. Samples were stained for fibrinogen and analysed with...
fluorescence microscopy or dehydrated and coated in gold palladium and analysed by scanning electron microscopy.

**Results:** On fluorescence microscopy fibrin strands in trapped blood appeared to be thinner than the strands found in spontaneous thrombus samples. Trapped blood displayed a disorganized mesh-like pattern. On scanning electron microscopy, a disorganized pattern was evident. There was a small number of clusters of platelets and multiple polyhedrocytes generated during the platelet contraction stage of the clot. There were also multiple debris and structures resembling casts of cells.

**Conclusions:** In conclusion, coagulum/trapped blood seen after sclerotherapy shares similarities with spontaneous thrombus formed over superficial veins. Trapped blood contains a vast number of polyhedrocytes confined into the fibrin strands. They also present a reduced number of clusters of platelets. However, the distribution of the fibrin strands is different showing a disorganized, mesh-like pattern and the strands seem to be thinner. There were also an increased number of cast structures that have not been described previously.

**Potential driving role of the component of the extracellular matrix, MFAP5, in the pathogenesis of varicose veins**

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**Background:** Despite the high prevalence of varicose veins, our knowledge of the molecular mechanisms underlying their pathogenesis is extremely scarce. There may be mechanical factors triggering a complex cascade of cellular reactions that may subsequently be amplified by genetic factors. Previously we have shown that extracellular matrix component – microfibril-associated protein MFAP5 (known to play an important role in maintaining the vascular integrity) acts as a potential key regulator of vein wall remodeling. So we aimed to investigate the effect (in terms of MFAP5 expression) of mechanical factors on the endothelial cells analogous to those that constitute the inner layer of the vein wall.

**Methods:** Determination of mRNA expression was performed by reverse transcription followed by real-time qPCR. Statistical analysis was performed using the qBase+ software.

**Results:** The functionality of the model used was verified by the effectiveness of the influence of laminar shear stress on the expression of key transcription factors (KLF2, ET-1, etc.). We observed the increase of the MFAP5 expression in endothelial cells upon exposure to laminar shear stress, which is consistent with our previous transcriptome analysis and is an additional confirmation of the potential driving role of this component of the extracellular matrix in the pathogenesis of varicose veins.

**Conclusions:** We conclude that the MFAP5 gene may contribute to the very initiation of the disease. Nevertheless, the further investigations are required. Experiments were supported by the Russian Science Foundation (Project 17-75-20223 "Investigation of the mechanisms of vein wall remodeling in varicose veins").

**Microbiological study in primary varicose veins**

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**Background:** Multiple etiologies of the varicose veins are postulated. Most accepted one is the incompetence of valve leading to dilatation of non-truncal as well as truncal veins, but the cause of incompetence of valve is still unknown. In the recent years bacterial etiology is being blamed for varicose veins. Aim of this study was to see association of bacteria with varicose veins.

**Methods:** A prospective study was conducted in Department of General Surgery, Institute of Medical Sciences, BHU, Varanasi, India. One Hundred patients of varicose vein were enrolled in the study. The patients of DVT and localized lower limb infection/Ulceration or systemic infection were excluded. The patients underwent radiofrequency ablation of great saphenous vein with multiple miniphlebectomy. Sample of miniphlebectomy and truncal veins was collected under aseptic condition, and sample was immediately sent to microbiology laboratory for bacterial culture and for 16s-rNAPCR analysis. Ten specimens of normal veins were taken for study.

**Results:** 42 truncal veins were cultured and bacteria grown were Micrococcus (17), Pseudomonas (6), Staphyloccocus (2), Klebsiella (4), Proteus (2), Citrobacter (1) and spore forming bacteria (1). Ten specimens were sterile. 113 non truncal veins were cultured and showed Micrococcus (31), Pseudomonas (14), Staphyloccocus (12), Klebsiella (6), Proteus (2), Citrobacter (2), Dipherhoides (2), Acenatobacter (1) and spore forming bacteria (12). 31 specimens were sterile. On PCR study, in 42 truncal veins results were, Pseudomonas (10), Staphyloccocus (6), Klebsiella (5) Proteus (2), Citrobacter (1), 11 could not be identified and 7 were sterile. On PCR study in 113 non truncal veins were Pseudomonas (25), Staphyloccocus (19), Klebsiella (7), Proteus (2), Citrobacter (1). 39 could not be identified and 20 were sterile. In normal veins, out of 10 cases, one showed growth of micrococcici.

**Conclusions:** In considerations of the findings, bacterial etiology for varicose veins may be considered.

**Functional polymorphisms in the NFKB1 gene and the risk of primary varicose veins in ethnic russians**

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**Background:** Primary varicose veins (PVVs) are common venous pathology of lower limbs. The etiology of this condition was postulated to be multifactorial, although current knowledge of genetic factors underlying PVVs development is still very far from being complete. The present study was aimed to investigate the influence of two functional polymorphisms rs28362491 and rs4648068 in the NFKB1 gene on the risk of PVVs in the sample of ethnic Russian individuals. This gene encodes a subunit of a pleiotropic transcription factor which controls the expression of multiple genes involved in cell proliferation, differentiation, adhesion, apoptosis as well as angiogenesis and inflammatory response.

**Methods:** Genotyping was carried out by real-time PCR allelic discrimination with TaqMan probes. 695 patients with PVVs and 269 control
Experiments were supported by the Russian Science Foundation (Project 17-75-20223 “Investigation of the mechanisms of vein wall remodeling in varicose veins”).

**Biomarkers of inflammation in chronic venous disease of the lower limbs**

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**Background:** To analyze serum biomarkers of chronic venous disease (cvd) in selected patients with primary reflux of great saphenous vein of the lower limbs.

**Methods:** Seventy-six patients affected by uncomplicated varicose veins were enrolled in the study. A unilateral primary axial reflux in great saphenous veins was detected in 51 patients (U-cvd) and a bilateral one in 25 patients (B-cvd). Sixty-five age and sex-matched subjects without venous reflux were enrolled as controls. Mean venous pressure of both lower limbs at the distal great saphenous vein and venous reflux were measured by continuous-wave Doppler ultrasound and echoduplex scanning respectively. Reactive Oxygen Species (ROS), tissue Plasminogen Activator (t-PA) and its Inhibitor I (PAI-1) activities, Hematocrit (HTC), White Blood Cells (WBC), Platelets (PLT), Fibrinogen and Blood Viscosity were assessed in blood samples drawn from the antecubital vein.

**Results:** B-cvd group showed higher fibrinogen values (P=0.005) and higher mean venous pressure (P=0.0001) in comparison to controls, while U-cvd did not. No difference was found between both groups and controls for all the other parameters.

**Conclusions:** Increased fibrinogen levels in patients with bilateral varicose veins may represent an early warning signal, as it could be associated to the long-term progression of chronic venous disease.

**Histological changes following closure FAST treatment**

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**Background:** In Germany, the crossectomy following the BABCOCK procedure and stripping of the great saphenous vein were considered as the “gold standard” in varicose treatment since 1907. Only in the late nineties of the last century was a new and less invasive treatment of varicose vein developed: the endovenous obliteration. It was our intention to make a contribution towards objectivizing the result after the Closure FAST therapy.

**Methods:** In our tests we made a mini-incision to remove a part of the great saphenous vein after radiofrequency treatment with the Closure FAST catheter for histological examinations.

**Results:** In all our patients we found the same alterations: A complete destruction of the intima layer, a denaturation of the collagen and a subintimal edema. After 4 months we saw a complete obliteration of the vein and a thrombus in organization with an immigration of granulocytes in the tissue.

**Conclusions:** After the Closure FAST treatment of varicose veins in 102 patients we have the histological proof for the destruction of the intima and the collagen with necrosis and destruction of the vessel wall. The result is the complete obliteration which was confirmed by Duplexscan and MRT after 1 year. The detailed statistical analysis follows.

**A novel view to varicose veins pathogenesis**

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**Background:** The advent of proteomics techniques allows large-scale studies of gene expression at protein level. Although morphological and anatomical studies indicate that venous wall weakening and subendothelial fibrosis characterize varicose veins, the pathogenesis of varicose veins remains poorly understood. The aim this study is to obtain protein expression profiles in patients with varicose veins. Finally, the identification of possible biomarkers may open possibilities for pharmacological inhibition of disease progression.

**Methods:** Varicose saphenous veins removed during phlebectomy and normal saphenous veins obtained during vascular surgery were collected for proteomics analysis. The same layers of venous wall from varicose and non-varicose veins were incubated, and the proteins released were analyzed by ion mobility spectrometry (IMS-MS) with Synapt G2.

**Results:** Proteomic analysis of the human vein revealed totally 1387 proteins. 200 proteins demonstrated significant differences in their quantity (more than 1.5 fold) between the two types of venous tissue (P<0.05). Among the most differentially expressed proteins 10 were found significantly decreased in the varicose vein tissue, and only two increased. CXXC-type zinc finger protein was more permanent (38-fold down regulated). The downregulation of CXXC-type zinc finger was confirmed by Western blotting. This protein is known as receptor for vascular endothelial growth factor. All differentially expressed proteins and their pathways, coexpression and physical interactions were analyzed in GeneMANIA and AmiGO databases.

**Conclusions:** This study provides novel insights into the biochemical mechanisms of this disease and a basis for further studies. Our proteomics discovery approach suggests that extracellular matrix degradation play a pivotal role in the pathogenesis of venous varicose. The identified proteins suggest that the varicose venous wall responds to a stressful condition and that proteolytic degradation of the cytoskeleton, inflammation and apoptosis of smooth muscle cells may be part of the response. Larger studies are required to confirm the potential and clinical role of the identified proteins.
Tissue texture affects overall interface pressure measurement

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**Background:** Interface pressure, the sine qua non for compression therapy, is defined as the pressure that occurs at the interface between the body and the support surface. Significant challenges remain in the understanding of interface pressure especially related to tissue texture and how it affects the measurement of interface pressure. We hypothesize tissue texture variation affects overall interface pressure measurement.

**Methods:** BISCO® (Rogers Co, Rogers, CT) MF-35 and HT800 silicone foams replicating fatty and bony tissue, respectively, were placed on a cylinder cuff model for the experiment. Picopress® was used for interface pressure measurement. External pressure was applied using an automated pressure cuff pump from 20mmHg to 80mmHg at 10 mmHg increments. 3 sample measurements were taken per pressure value. Interface pressure recordings were compared between the MF-35 and HT800 foams at different pressure increments using linear fixed effect model (SAS software, version 9.4, SAS Institute, Cary NC).

**Results:** Interface pressure measurement using Picopress® on 2 different foam surfaces showed statistical significant variation from 30mmHg to 80mmHg. At 20mmHg, interface pressure measurement was not statistically different between the MF-35 and HT800 foams. Interface pressure measurement tended to measure higher value on softer surface, MF35 than harder surface, HT800 (Table 1).

<table>
<thead>
<tr>
<th>Pressure (mmHg)</th>
<th>MF-35</th>
<th>HT800</th>
<th>Difference</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>20mmHg</td>
<td>21.9</td>
<td>21.9</td>
<td>0.0</td>
<td>&gt;0.999</td>
</tr>
<tr>
<td>30mmHg</td>
<td>32.3</td>
<td>31.1</td>
<td>1.2</td>
<td>&lt;0.001</td>
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<tr>
<td>40mmHg</td>
<td>42.7</td>
<td>40.7</td>
<td>2.0</td>
<td>&lt;0.001</td>
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<tr>
<td>50mmHg</td>
<td>53.1</td>
<td>49.1</td>
<td>4.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>60mmHg</td>
<td>63.6</td>
<td>58.1</td>
<td>5.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>70mmHg</td>
<td>74.7</td>
<td>67.1</td>
<td>7.6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>80mmHg</td>
<td>84.4</td>
<td>76.2</td>
<td>8.2</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**Conclusions:** Tissue texture variation may affect overall interface pressure measurement using Picopress®. Harder surface tended to register lower interface pressure measurement than softer surface.

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**Development and validation of the psychometric properties of a self-reported questionnaire assessing adherence to the wearing of elastic compression stockings**

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**Background:** To identify the discriminant questions of a short self-questionnaire measuring patients’ adherence to the wearing of elastic compression stockings and to validate its acceptability, test-retest reliability, internal consistency and external validity.

**Methods:** The gold standard for the development of an evaluation questionnaire involves the use of varimied rotation to reduce the number of its item and then to evaluate its internal consistency using Cronbach’s alpha test. Its external validity was evaluated by comparison to the electronic record of the wearing of the elastic compression using electronic thermic captors. Then the study defines the adherence threshold using ROC analysis to determine its sensitivity and specificity.

**Results:** The study included 79 patients. The mathematical methods obtained a reduction of the number of questions of the initial questionnaire from 22 to 5 rated from 0 to 4. The internal consistency of this 5 item self-questionnaire is good with a Cronbach Alpha coefficient of 0.7. Its external validity is satisfactory with a correlation of -0.4 (P: 0.0003) with the compliance index. The analysis of the ROC curve shows that values of the score ≤3 corresponds to a good compliance to the elastic compression while values >3 correspond to poor compliance with a sensitivity of 88.1% and a specificity of 63.1%.

**Conclusions:** The adherence score is valid for the detection of patients poorly compliant to the wearing of elastic compression. Its small number of questions makes it a suitable tool for this screening of poor compression compliance in everyday practice.

Misfitting measures? Contrast between anthropometric leg parameters and commercially available compression stockings

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**Background:** Compression Therapy is the most traditional treatment for varicose veins, venous edema, ulcerations, etc and elastic stockings (ES) have been used worldwide. The pressure delivered by the ES is proportional to stockings fabric strain. There is no open source data about anthropometry studies that supports ES modeling and its interaction with lower limbs.

Our objective is to trace a lower limbs anthropometric profile and cross it with ES label measures.

**Methods:** A Cross-sectional analysis was performed analyzing 1075 medical records. 1650 legs avatars from eletronic measured were collected. Label measures from ES commercial available in Brazil were sort to compare with the data.

**Results:** Huge amount of descriptive data have been produced. Highlights include: each ES sample has only 71% off coverage on average and 1.5% of all legs don’t have any match with the available ES. Considering only measures from this complete Misfit group, all calf’s circumference are proportionally bigger in relation to ankle. A calf – ankle ratio bigger than 1,77 implies 12.5% odds of complete Misfit and only 42% chance to fit into a non-specific ES.

**Conclusions:** ES are an important tool to manage venous disease. Their prescription demands knowledge about patient leg’s measures and its proportion. Limbs with higher calf – ankle ratio (1,77 or higher) have an increased Misfit risk.

Compression therapy in everyday life: let the patients have the floor

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**Background:** Compliance to the compression therapy is the main key for its efficacy, and there is a universal agreement that progresses are needed in this field. The aim of this survey was to evaluate the feeling of the patients about their own compression treatment.
Methods: An auto-questionnaire consisting of six open questions was proposed to patients wearing long term compression stockings for a chronic venous disorder. The questions related to the way they felt about their treatment, their three main motivations and three main difficulties, and how they had felt about their treatment when it was prescribed for the first time.

Results: The survey was carried out in august 2015 and may 2016. 283 subjects were enrolled in 15 centers. 59% of the patients felt positive about their treatment when 16% were negative. The main motivations for subjects were enrolled in 15 centers. 59% of the patients felt positive about their treatment when 16% were negative. The main motivations were the improvement of symptoms (46%), the control of edema (24%). The main difficulties were related to the discomfort in warm environment (43%), the donning of the stockings (33%), and the esthetic consequences (23%); 18% reported a total absence of difficulties. Among the advice that patients received at the beginning of treatment, the most useful came from the vascular physician (28%). In many cases, the investigators were surprised about the answers of their patients.

Conclusions: This survey shows how important is the practical teaching of the patient by their prescribing physician, as well as the attention paid by the physician to their experience and feeling.

Impact of class I compression stockings on cross-sectional area of calf deep veins and great saphenous vein in healthy subjects

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Background: Elastic compression improves venous pumping function of lower extremities. The mechanism of compression is considered as a venous narrowing. The exact impact of different compression garments on deep and superficial veins is still under investigation. The aim was to examine the impact of class I compression stockings on cross-sectional area of calf veins in healthy subjects.

Methods: The study has been conducted on a 25 healthy volunteers without any signs/symptoms of chronic venous disease. There were 12 women and 13 men aged from 20 to 48 years (mean 31). We performed duplex ultrasound on one of the subjects’ legs before and after applying compression stocking (Venotrain discretion®). The cross-sectional areas of one of the posterior tibial veins (PTV) and great saphenous vein (GSV) were measured (in cm²) at the same level in a mid-calf in both standing and prone positions.

Results: Cross-sectional area of PTV in the standing position before and after compression was 0.19±0.11 and 0.17±0.08 with 11% reduction (P=0.044). In the prone position cross-sectional area of PTV reduced by 29% from 0.17±0.10 to 0.12±0.08 after applying compression (P=0.001). Cross-sectional area of GSV didn’t change significantly both in the standing position (before compression 0.11±0.07, after 0.10±0.04, P=0.897) and in the prone position (before 0.09±0.05, after 0.07±0.03, P=0.109).

Conclusions: Applying class I compression stockings results in a significant narrowing of the calf deep veins in healthy subjects in standing and prone positions. No significant impact of class I stockings on GSV was confirmed.
VENOUS THROMBOEMBOLISM

Reducing sludge in deep veins with neuromuscular stimulation

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Background: As blood flow slows or stops for an instant, echo-bright aggregates appear within the lumen of veins. This “erythrocyte sludge” can be quantified using a grey scale index (0-255) termed the venous sludge index (VSI). The aim was to investigate the effect of the common peroneal nerve stimulator (CPNS) on venous sludge formation.

Methods: The right popliteal vein of 25 healthy volunteers was sonicated using B-mode ultrasound in longitudinal and transverse views, standing and lying. First with the CPNS off and then with the CPNS on. A single frame out of the possible 154 frames (7 seconds) was selected from the video recordings using a random number generator (Random.org). Image analysis (ImageJ) was used to measure the VSI.

Results: The CPNS device significantly reduced the VSI irrespective of the subject’s position or the view of the transducer (P<0.0005, Wilcoxon). Expressed as median (inter-quartile range). In transverse view, CPNS reduced the VSI from 20.7 (13.6 - 32.2) to 1.1 (0.6 - 2.7) standing, and from 11.4 (6.3 - 15.9) to 0.8 (0.5 - 2.1) lying. In longitudinal view from 27.7 (18.8 - 41.4) to 2.7 (1.1 - 3.2) standing, and from 11.7 (5.8 - 17.5) to 1.5 (0.5 - 3.1) lying.

Conclusions: Venous sludge and stasis is significantly reduced using the CPNS device. Since stasis is a significant component of Virchow’s triad, this may explain the principle mechanism of action of CPNS in reducing venous thromboembolism risk. However, the exact relationship between stasis, aggregation and thrombosis requires more research.

Registration study for real life evidence of anticoagulation treatment in Chinese venous thromboembolism (VTE) patients (REACH study)

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Background: Venous thromboembolism (VTE), which comprises deep vein thrombosis (DVT) and pulmonary embolism (PE), is a worldwide health problem with millions of events every year in China. However, there is a paucity of real-life data on the risk factors, clinical presentation, diagnosis, and therapy. The REACH (Registration study for real life Evidence of Anticoagulation treatment in Chinese Venous Thromboembolism patients) study in VTE registry is a prospective non-interventional study, which has been designed to address clinical characteristics and current management of VTE patients in China, aiming to understand health care resources for VTE and potential needs for improvement in the future.

Methods: The REACH in VTE registry was a prospective, non-interventional, observational, multicenter study conducted in at least 50 tier 3 hospitals in China. Eligible patients with age of over 18 years-old, clinically diagnosed as VTE were enrolled in the study and followed-up for at least 6 months. The characteristics as well as the therapy of the VTE patients, including surgical methods, anticoagulant treatment patterns, clinical outcomes, therapeutic safety and treatment satisfaction were documented. Follow-up data was collected through the visit in the out-patient department or telephone calls.

Results: From August 8th 2013 to August 31th 2017, 10520 patients in China were enrolled in the registry. The average age of VTE patients was 58±16.0, with a roughly equal proportion of men and women. Long-term bedridden was the major risk factor of VTE patients of whom 36.5% had history of operation, fraction or paralysis. Among the patients of DVT admitted to the hospital, 12.8% patients were diagnosed as DVT complicating PE. The majority of patients with DVT received non-operative therapy (64.3%) while the others undergone operation treatment (35.7%), including catheter-directed thrombolysis, placement of inferior vena caval filters and thrombectomy. The proportion of parietal heparin in combination with VKA as initial treatment for DVT decreased from 57.6% before 2015 to 43.1% after 2015. By contrast, an increasing proportion of patients received the new oral anticoagulants as initial treatments in China (42.4% before 2015, 56.9% after 2015).

Conclusions: The REACH in VTE registry will provide valuable and real-life data of characteristics of patients with VTE and their management pattern, as well as the use of medical care resources in VTE across China in clinical practice.

Use of superior vena cava filter in the management of upper limb venous thrombosis

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Background: With the advent use of central lines and pacemakers upper limb DVT is increasing. Upper extremity DVT has 5-10% chance for developing PE. As anticoagulation is the first line of upper limb DVT treatment and when it is contra indicated filters become an option.

Objective: Evaluation of SAVC filters safety and effectiveness in patients with upper limb DVT and contra indicated to full anticoagulation.

Methods: Forty nine patients with acute upper limb DVT were admitted to Alexandria armed forces hospital from Jan. 1st 2015 to Dec. 31st 2016. Six patients were contra indicated to anticoagulation and SVC filter was then percutaneously inserted followed by chest x ray and pulmonary pressure measuring was done. Patients were clinically and radiological (CT angiogram) were followed-up fo PE or superior vena cava syndrome.

Results: No complications such as filter migration, fracture or dislocation was detected. No patient developped PE or superior vena cava syndrome.

Conclusions: Percutaneous SVC filter placement is a safe and effective method for prevention of PE in upper extremity DVT patients with contraindication for full anticoagulation.

1H-Nmr spectroscopy metabolic profiling of serum in the inferior vena cava ligation murine model may discriminate deep vein thrombosis age

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Background: Deep vein thrombosis (DVT) is a prevalent condition responsible for significant morbidity and mortality, presenting a profound
economic burden on healthcare systems. 20-50% will develop post-thrombotic syndrome (PTS) despite adequate anticoagulation therapy. The use of thrombolysis during acute DVT may reduce the long-term complications of PTS. Thus, establishing thrombus age is critical. Current estimation of thrombus age is based on patient description of time of symptom onset. We aim to identify metabolic markers of thrombus age in mice.

**Methods:** The well-established inferior vena cava (IVC) ligation mouse model was used to generate DVT with comparison to sham laparotomy controls. Serum was obtained from DVT and control mice at days 2 (acute DVT), 6 and 14 (chronic DVT). 1H-NMR spectroscopy untargeted metabolic profiling was performed. The data was subjected to multivariate and univariate statistical analysis. **Results:** Twenty-four serum metabolites were identified. Lactate, choline, HDL and LDL-VLDL were present at significantly different levels in the serum of DVT mice compared to sham control animals at day 2. These differences were not statistically significant at days 6 and 14, suggesting that metabolic changes in thrombus formation and maturation occur early in the DVT process. **Conclusions:** In the murine model, a metabolic disturbance is prominent in the early stages of DVT. This has important translational mechanistic and therapeutic applications in human DVT. Further work is required to examine the metabolic profile in the first 48 hours, exploring the underlying biological pathways.

**Associations between inferior vena cava thrombosis and pulmonary embolism risk in symptomatic venous thromboembolism: a prospective and observational cohort study**

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**Background:** Our prospective and observational cohort study was performed to evaluate the prevalence and clinical significance and pulmonary embolism risk of IVCT in VTE patients.

**Methods:** A total of 846 patients hospitalized for symptomatic VTE in our center were evaluated by inferior vena cava (IVC) venography and pulmonary angiography. The clinical characteristics of the VTE patients complicated with IVCT were analysed. The patients were followed-up for 30 days for short-term prognosis analysis.

**Results:** PE was more common in deep venous thrombosis (DVT) patients with IVCT than in those without Multivariate logistic regression analysis showed that IVCT was an independent risk factor for PE. Trauma immunological diseases, and previously diagnosed VTE increased the risk for IVCT. No deaths occurred in patients with IVCT.

**Conclusions:** IVCT is widely observed in VTE patients and increases the risk for PE. Trauma, previously diagnosed VTE, and particular immunological diseases were shown to be independent risk factors for IVCT.

**Crossover catheter-directed thrombolysis (C-CDT): a reasonable solution for acute DVT involving the whole leg**

Mingjin Guo
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**Background:** This study aimed to evaluate the efficacy and feasibility of Crossover catheter-directed thrombolysis in patients with Acute DVT involving the whole leg.

**Methods:** Crossover catheter-directed thrombolysis was used in 232 patients with full-limb DVT, the onset time of 3 hours to 14 days. Puncture the contralateral common femoral vein, retrograde manipulation of the guide wire through the thrombosis of the iliac vein, femoral vein, popliteal vein to the calf vein, and then, after initial establishment of venous blood flow channel by ballooning the occluded veins, Catheter for direct contact thrombolysis. Postoperative observation parameters include: thigh and calf circumference, plasma D-dimer level, APTT time, fibrinogen levels, platelet count and venography.

**Results:** All 232 patients, in addition to two patients with Crossover difficulties, has to puncture ipsilateral femoral vein to use a catheter to assist the Crossover, the success rate of Crossover surgery technology reached 99.14%. Subsequent anticoagulation and thrombolytic therapy, 14 patients with varying degrees of bleeding complications. 92 patients with iliac vein compression, iliac vein stent implantation. Surgical treatment of the vein patency rate of 100%. After discharge the patients are strictly regulate the use of anticoagulant drugs, followed-up for 6-30 months, 7 patients relapsed, the rest did not see significant recurrence and venous stenosis.

**Conclusions:** The crossover catheter-directed thrombolysis is a very effective and feasible method for completely and quickly dissolving the acute DVT with no obvious complication. It is a reasonable solution for acute DVT involving the whole leg.

**Technical safety, feasibility and accuracy of ultrasound guided bedside placement of inferior vena cava (IVC) filters**

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**Background:** To report technique feasibility and safety of inferior vena cava (IVC) filter placement under bedside ultrasound guidance.

**Methods:** Medical records of all 2856 patients who had IVC filters placed under ultrasound guidance between January 1, 2007 and December 31, 2016 were retrospectively reviewed for pertinent history, results, and complications. All filters were placed using a ultrasound guidance filter deployment technique. Venous access was via the right femoral, left femoral, or right internal jugular vein.

**Results:** Filters were successfully placed within the IVC in 99.7% of the patients without malpositioned filter. Complications included groin hematoma (0.07%), deep venous thrombosis at the site of vascular access (0.31%), and filter tilt >15° along the long axis of the IVC (0.03%).

**Conclusions:** The bedside ultrasound-guided IVC filter placement is technically feasible and safe with improved placement accuracy and cost effective, compared with the filter deployment under fluoroscopic venogram imaging.

**Catheter directed thrombolysis in the treatment of acute DVT, A single center study**

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**Background:** Venous thromboembolic disease (VTE) affects approximately 0.1% of the general population each year. Over 60% of cases are related to healthcare intervention, There is world’s most population in China and also have the most DVT patient. The purpose of study was to evaluate the safe and effective of Catheter-directed thrombolysis at DVT.

**Methods:** From 2008, Jul 2015, Jun 129 Patients of DVT, accepted
Catheter-directed thrombolysis (CDT) in our department. Men 70-54.35%, female 59-45.65%, mean age of 53.85±14.54 years. All patients were diagnosed to DVT by ultrasound before treatment. CDT Access was antegrade approach and that implanting catheter along the blood flow can reduce the damage to the valve. 750,000 U of urokinase per day was infused into the position of thrombosis by Unifuse catheter for 2 d—5 d. Monitoring and end-point of CDT was to no significant changes in clinical symptoms or deterioration, Fib g/L <1, D-dimer μg/L was no change or decrease; patients with bleeding tendency etc.

Results: In all 129 Patients, Acute 107 cases 82.60%, subacute12 cases 8.70%, chronic 9 cases 6.52%, Left side 102 cases 78.26%, right side 17 cases 13.04%, bilateral 12 cases 8.70%. Central type 12 cases 8.70%, peripheral 5 cases 4.35%, hybrid 112 cases 86.96%. Urokinase dose 233.59±112.17 × 104 U and Course of treatment 3.49±1.59 d. Symptoms improved significantly at 126 cases 97.83%, No significant improvement in another 3 chronic cases 2.17%. No complication of needed to surgical intervention during CDT.

Conclusions: Catheter-directed thrombolysis is safe and effective. It can be a therapeutic technique by selected for DVT, but the research being further still needs to be continued.
SCLEROTHERAPY

Instructions after chemical ablation of varicose veins – Patient’s behavior after sclero-sessions
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Background: Instructions sclerotherapists give their patients after chemical ablation are various. All these recommendations rely on experience but it is not easy to find evidence for these advices. The German sclerotherapy working group started a survey in the German society of phlebology in 2015 to have more information in the post-treatment care.

Methods: The doctors were asked to communicate the recommendations they give their patients after a sclerotherapy session, which kind of sports are allowed, co-medication, kind of thrombosis prophylaxis, recommendation for hot bath, shower, sunexposure, seasonal influence performing sclerotherapy, thrombectomy and compression therapy.

Results: We think that it is of practical importance for doctors to extend the survey on an international level to discuss and analyze the possible benefits of the post-treatment recommendations.

Conclusions: We suggest to send a questionnaire on the above mentioned individual behavior after sclerotherapy to the phlebological societies of the UIP. Furthermore we would like to present an online voting during the congress in order to collect further datas on this topic.

Periscierotherapeutic management – Patient’s behavior after sclero-sessions
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Background: The recommendations given by phlebologists to their patients after sclerotherapy treatment rely on much experience and very little evidence. Therefore the sclerotherapy working group started a survey in the German society of phlebology in 2015. The aim of this survey was to compile and summarize these individual recommendations after sclerotherapy procedures.

Methods: We sent a questionnaire with 25 questions regarding 7 different topics about individual behavior after sclerotherapy sessions to 1634 email addresses of doctors all over Germany. 91 of them filled in the questionnaire and sent it back (28 dermatologists, 19 surgeons, 16 vascular surgeons, 13 general practitioners, and 6 internal medicine specialists; 68 of them with an additional specialization in phlebology). We asked the doctors to communicate the recommendations they give their patients after a sclero-session concerning: motion after sclerotherapy, which kind of sports are allowed, co-medication, the preferred kind of thrombosis prophylaxis, recommendations for sun exposure or other sources of warmth, period of performing sclerotherapy: summer or winter, and compression.

Conclusions: We present these results.

Midterm results of an outpatient program with ultrasound-guided foam sclerotherapy for treating chronic venous disease in low-income population of Salvador, Brazil
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Background: Six million people need treatment for advanced Chronic Venous Disease (CVD) in Brazil. Most patients depend on the Government Health Care, which actually treat 70.000 patients/year. Recently UGFS was approved for CVD treatment by the Government. To assess midterm results of an outpatient program with ultrasound-guided foam sclerotherapy (UGFS) for treating CVD in low-income population of Salvador (Brazil).

Methods: Single-public-center prospective-study; 4851 limbs of 2.894 outpatients (C2-C6) were treated with UGFS between 2013 and 2016. UGFS with Polidocanol (1%-3%) was performed, in association with compression therapy (stockings 20-35 mmHg, Unna’s boot or Circaid) and specific dressings. Treatment efficacy was assessed by means of clinical examination, photography documentation and duplex-ultrasound at 1-2-3-4-12 weeks, 6 months, 1 year and yearly.

Results: patients (85%F and 15%M, mean age 59y) had the following CEAP-C distribution of their limbs: C2=917 (19%), C3=1.523 (32%), C4=942 (19%), C5=393 (8%) and C6=1076 (22%). Mean follow-up duration was 22,5-months; A mean of 2.2 sclerotherapy-sessions, 22,6 mL of foam-dose (C2 12.1 mL, P<0.05), and 6.8 outpatient weekly-visits(C6 17 visits, P<0.05) were performed to treat the patients. Immediate saphenous occlusion rate was 96% and ulcer-healing rate was 77%. At the latest follow-up saphenous vein recanalization rate was 15%. Main complications were: skin pigmentation (1.089, 22%), superficial thrombophlebitis (203, 4%) and deep vein thrombosis, mostly in calf veins(31, 0.7%).

Conclusions: This outpatient UGFS program in low-income population was effective and safe and it may represent an alternative to surgery to treat advanced CVD.

Evaluation and follow-up of pulmonary arterial pressure during echo-guided scleromousse of lower limbs’ varicose veins
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Background: The echo-guided scleromousse is to be considered a procedure of election for the treatment of varicose veins and has largely contributed to improve living and health conditions in people suffering from varicose pathology of any age. The case studies follow-up has increased through a simultaneous echocardiography during the scleromousse procedure.

Methods: 50 peoples have been evaluates, 24 males and 26 females, with an average age of 57,5 years coming to Phlebology unit with a situation of vein failure Ceap 2; they have all accepted to undergo an echo-guided scleromousse treatment. People suffering from secondary and idiopathic pulmonary hypertension have been ruled out, as well as cardiopatic patients wit FE lower than 55% and/or VS and/or dilated VD, CRF, chronic respiratory failure and collagenopathies. All patients have sustained echocardiography in basal condition (TO) at the onset of “bub-
Sclerotherapy complications in the daily office practice: lessons learned
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Background: Sclerotherapy has been satisfactorily used for the treatment of patients with telangiectasias (C1) and varicose veins of the lower extremities (C2-C6). Although it seems to be safe, reports of side effects and complications have been published.

The aim was to describe and report incidence and frequency of side effects and complications of liquid and foam sclerotherapy in patients with C1 to C6 in CEAP classification.

Methods: 4687 sessions of sclerotherapy (CEAP C1- 22.76%, C2-52.36%, C3- 4.62%, C4- 14.76%, C5 1.4%, C6-4.1%) among 2493 patients of median age 53 (interquartile range IQR 16-92) were carried out between 2008 and 2017. Data on local and systemic complications immediately after the sclerotherapy session and after 1, 6, and 12 months were obtained and analyzed with reference to literature.

Results: Hyperpigmentation and matting were the most common local complications (16.96% and 9.44%, respectively), but usually transient (permanent 1.4% and 0.6%). Other local complications included also superficial thrombophlebitis (4.42%), pyoderma gangrenosum (0.62%) and cutaneous necrosis (0.68%). Systemic complications which included deep vein thrombosis (0.59%), neurological complications, such as seizures (0.002%), visual disturbances (1.58%), migraine (0.7%), anaphylaxis (0.0002%) and cardiac toxicity (0%) were rarely observed.

Conclusions: Sclerotherapy is a safe and effective method of treatment of the patient with C1 to C6 but we should be aware of the possible local and systemic complications.

Sclerotherapy: a comparison between the Latin American and European Consensus with the Australasian Guidelines
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Background: The new techniques, imaging and blood tests had given a better understanding on both, the physiopathology of CVD and the effects of sclerostatic agents in varicose veins. Therefore, it has become the most used treatment worldwide; however every physician has his own way to perform it, producing a variety of results. This is why experts on this field saw the necessity of reunite and create consensus about the important aspects of this treatment.

Background: To compare the 2nd European Consensus (2006, Tegernes, Germany) and the 1st Latin American Consensus (2012, Buenos Aires, Argentina) with the Australasian College of Phlebology (ACP) guidelines.

Methods: A revision of the three papers.

Results: The three papers have many similarities, especially with the materials used, the caliber of the varicose vein to treat, sclerosant agent and foam technique. However the European consensus explains in a more detailed manner the safety aspects for the treatment of every type of varicose vein, the contraindications of the treatment and the information that should be given to the patient. And the ACP guidelines explain a step-by-step way to make the procedure.

Conclusions: Nowadays Sclerotherapy is worldwide the most spread technique for treating varicose veins. Being operator dependent the results may vary around the world. Consensuses are the guide physicians must use in order to consolidate the technique. The ACP guideline for microsclerotherapy is a very specific document for every practitioner willing to use this technique.

Foam sclerotherapy for the treatment of venous ulcer
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Background: Venous Ulcer (VU) is the major complication of Chronic Venous Insufficiency (CVI) having many negative consequences, including suffering for the patient and his family, high expenses and work impediment. Many patients spend a long time searching for an effective treatment because physicians often spend too much time focusing on treating the wound and not the cause.

In our center we give priority to treatment of the venous hypertension, the cause of the VU in varicose patients. We only perform clinical evaluation of the patients, and our treatment consists on 4 pillars: Foam sclerotherapy, elastic compression, daily hygiene (at home) and physical rehabilitation (at home).

Background: To show that sclerotherapy for treatment of CVI is adequate and can gives great results in VUs.

Methods: Descriptive study. We studied 450 VU from 310 patients of the 2400 new patients that came to our center in 2016. We excluded incomplete clinical records, patients that abandoned the treatment prior to the end, patients that didn’t heal, 55.06% reduce a 60% of its area.

Conclusions: We have found that every ulcer has an underlying venous reflux point. The use of Sclerotherapy gives great results, reducing size and time of evolution which are the main factors for ulcer healing. Patient education is fundamental.

A modified foam treatment in chronic venous insufficiency: experience over 3000 patients
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Background: To compare the effectiveness of an alternative treatment (ligation plus foam sclerotherapy) with that of a classic stripping technique.
Methods: The study included 2577 and 3563 patients who had undergone classic stripping and foam sclerotherapy, respectively, within the previous 12 years. Preoperative and postoperative CEAP class, symptoms, recurrence, and Doppler findings of the two groups were compared.

Results: There were no differences between treatments in terms of postoperative symptoms, Doppler findings, or CEAP class. The predictors of postoperative CEAP class were bilateral limb disease and prior deep vein thrombosis (DVT), whereas the predictors of symptom recurrence were bilateral limb disease, preoperative CEAP class, occupation, and familial or genetic predisposition. The predictors of postoperative perforator incompetence (PI) were occupation, aged 60 and older, preoperative CEAP class, and preoperative PI, whereas the only predictor of postoperative deep vein incompetence (DVI) was preoperative DVI. Five-year symptom-free survival rates were 52±0.6% in the foam sclerotherapy group and 47±0.3% in the stripping group.

Conclusions: The safety and efficacy of ligation plus foam sclerotherapy as an alternative technique allowing for same-day surgery to treat varicose veins are the same as those of classic stripping. The predictors of postoperative outcome depend on individual patient characteristics.

The efficacy and safety of the endosclerosis treatment with foam of the hemorrhoids, ten years of follow-up
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Background: Aim of the study was to prospectively evaluate the efficacy and tolerability at 10 years of the endoscopic treatment of hemorrhoidal disease using sclerofoam with polidocanol.

Methods: All patients underwent a standard clinical work-up and only those fulfilling the inclusion criteria were recruited. Inclusion Criteria: symptomatic hemorrhoidal disease lasting more than 8 months of any grade, repeated bleeding at least twice a week, constant pain during evacuations constant discomfort in daily activities. Exclusion criteria: severe rectal prolapse, allergy to sclerosing agents, preference for surgery. Among those recruited, 90 males and 60 females, aged between 18-75 years completed the 1 year follow-up. All patients were treated on two or three separate occasions: on day 1 and 30 and sometimes 60 day, and they received a 1% sclerofoam. All patients were scheduled for subsequent follow-up visits at 90, 180 and 360 days after completing the procedure and also a 2.3 and 10 year of follow-up. At each visit for each we collected data on number of bleeding episodes, hemorrhoid worsening, pain and discomfort by means of a quality of life questionnaire and a standardized pain scale.

Results: At 1 years 85.3% (CI 80.9-88.9) of treated patients had significantly less symptoms and discomfort and the time to reach the minimum averaged 62.5 days (CI 53.9-71.2). Minimum values of pain scale and bleeding episodes reached a minimum after 58.4 (CI 46.6-70.2) and 50.7 days (CI 38.3-63.1) respectively. Quality of life improved quickly and the time to reach the maximum value averaged 63.6 days (95% CI=54.1-73.1). According Goligher classification the percentage of hemorrhoids degree was: I degree: 9.9%; II degree: 66.3%; III degree 21.8%; IV degree 2%; At 10 years the results was 86% wellbeing but 13% repeated the procedure, 10% underwent to surgical treatment, and 4% drops out.

Conclusions: The study and the 10 years of follow-up suggests that the endosclerofoam of haemorroids is safe, well tolerated and effective in reducing symptoms and improving quality of life.
Investigation on trunk diameters of the great saphenous veins in daily practice of phlebology in France (diagrams study by the French Society of Phlebology)

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Background: Regarding the literature, failure of foam sclerotherapy seems to be more frequent if the diameter of the treated vein is >6 mm. The objective of this study was to evaluate the distribution of the GSV's diameters in daily practice of phlebology in France.

Methods: Thirty-five French phlebology centers were involved in this observational prospective study conducted by the French Society of Phlebology. The inclusion criteria were: C0s to C6 from CEAP clinical classification in patients with venous symptoms and/or signs of chronic venous disorders and without any previous treatment of at least 1 of the GSVs. The patients completed a venous symptoms questionnaire. The GVS diameters were measured at mid-thigh level (standing position); refluxes were considered pathological if >0.5 sec.

Results: 1245 patients were included (77% female, mean age 52, mean BMI 25); 69% of the patients had venous symptoms. Predominant CEAP classes were C1 (35%) and C2 (38%). No reflux of the GSV has been detected in 62% of all patients (mean diameter 3.7mm). In case of reflux (38% of cases), mean diameter was 5.6mm and distribution for this group was: 62% <6mm, 30% between 6 and 8 mm and 8% >8mm.

Conclusions: In daily practice of phlebology in France, more than 60% of the patients have competent GSVs. On another hand, in patients with refluxing GSVs (38% of cases), mean diameter was 5.6mm and distribution for these patients was: 62% <6mm, 30% between 6 and 8 mm and 8% >8mm.

Perforators are unidirectional and valved – the evidence

Brigid Geraldine Hill, Andre van Rij, Greg Jones

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Background: The role of the perforator veins between the deep and superficial venous system of the leg is a critical one. Despite this there continues to be a long standing debate regarding the functional anatomy of these veins in the normal subject. Some say they are unidirectional with valves directing flow from superficial to deep while others claim they are both unidirectional and bidirectional. We review our evidence from two observational studies.

Methods: A study of 20 normal subjects confirmed not to have superficial or deep reflux were examined by ultrasound to characterize leg perforators for location, size and function with a variety of augmentations, postures and exercise. A study of 6 normal subjects using retrograde resin casting venography in amputated limbs previously examined by ultrasound for location of perforators and their function on augmentation. The resin caste perforators were examined for their connections and with light microscopy for valves and their orientation.

Results: In the 20 normal limbs there were 13 (median, range 8-21) perforators per limb. Of 283 perforators all were competent, unidirectional from superficial to deep with all maneuvers and postures. Valves were identified only at the ankle in larger short perforators. The 6 resin castes showed all perforators to have valves (1-4) oriented for flow from superficial to deep. These perforators also had multiple side branches with competent valves.

Conclusions: In normal lower limbs, defined as those in which there is no superficial and deep venous disease, all perforators are competent with valves directing flow from the superficial to deep.

Obesity, chronic venous insufficiency and the anatomy of the popliteal fossa

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Background: Obesity increases venous reflux resulting in more severe clinical venous disease. Weight loss following bariatric surgery improves the skin manifestations associated with CVI. However, some obese subjects with skin changes typical of CVI have no venous reflux. Their skin changes have been attributed to popliteal vein compression inducing venous hypertension. Obese subjects have reduced mobility, changes in gait and increased hyperextension on standing and walking. We are exploring the differences in the popliteal fossa as a result of obesity that may predispose to this.

Methods: We are comparing the CT appearances of the popliteal fossa in a cohort of obese (BMI >30) and non-obese subjects (BMI <25).

Results: In obese patients, mostly C0/C1 but some C2, the popliteal fossa is larger, with more hypertrophy of the popliteal vein and its tributaries. This may be due to increased venous pressure. In normal subjects, the popliteal fossa size was smaller, with less venous pressure.

Conclusions: Obesity results in several complex changes in the popliteal fossa, which may contribute to popliteal vein compression. The relationship of these factors to severity of skin changes of CVI needs to be established.

Ultrasonic vein angiography in complicated CVI cases

Alexander Albatskiy

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Background: Duplex angioscanning is currently considered by all surgeons as the primary method of instrumental diagnosis of various forms of chronic venous insufficiency. It gives detailed information about the state of the deep, superficial and communicating veins and solves issues of medical tactics in the vast majority of patients. The efficiency and diagnostic accuracy of angioscanning decrease with lymphatic insufficiency.

Methods: A study of 20 normal subjects confirmed not to have superficial or deep reflux were examined by ultrasound to characterize leg perforators for location, size and function with a variety of augmentations, postures and exercise. A study of 6 normal subjects using retrograde resin casting venography in amputated limbs previously examined by ultrasound for location of perforators and their function on augmentation. The resin caste perforators were examined for their connections and with light microscopy for valves and their orientation.

Results: In the 20 normal limbs there were 13 (median, range 8-21) perforators per limb. Of 283 perforators all were competent, unidirectional from superficial to deep with all maneuvers and postures. Valves were identified only at the ankle in larger short perforators. The 6 resin castes showed all perforators to have valves (1-4) oriented for flow from superficial to deep. These perforators also had multiple side branches with competent valves.

Conclusions: In normal lower limbs, defined as those in which there is no superficial and deep venous disease, all perforators are competent with valves directing flow from the superficial to deep.
was necessary to reintroduce “Levovist” contrast media. Complications after the administration of contrast material have not been seen. We have examined 20 patients with complicated forms of varicose vein and post-thrombotic disease. All patients had significant lower limb lymphedema. All the patient examinations were first performed by conventional ultrasound procedure, and then - with the “Levovist” echo-contrast agent.

**Results:** In 12 varicose patients in trophic disorder stage and severe edema - ultrasonic angiography revealed perforating veins in the femoral and crural region, which with conventional ultrasound were not detected. In 1 post-thrombotic patient, asymptomatic non-occlusive thrombus of the superficial femoral vein was detected in the Hunter channel with contrast material. In 7 cases popliteal recanalization in common and superficial femoral veins could be seen, which in conventional ultrasound was not detected because of marked edema.

**Conclusions:** Based on these data we can conclude that Ultrasonic Angiography with contrast media is indicated in patients with complicated forms of CVI. It significantly improves the visualization of the perforating veins of the calf and thigh, as well as the deep veins in “difficult” anatomical areas.

**Early ultra-sonographic findings after venous sclerotherapy: an ultrasound guided description of the post-foam sclerotherapy sign**

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**Background:** To describe the short term ultra-sonographic findings in patients submitted to foam sclerotherapy aiming to avoid misunderstandings in post-procedural Duplex Ultrasound. To propose foam sclerotherapy color codification in the Duplex Ultrasound universal report.

**Methods:** After a formal literature review of post-sclerotherapy follow-up, we studied 260 patients in time lapse of 1 to 4 weeks. Thereafter, we proceed to record the findings. Finally we continued to represent the findings in the universal Duplex Ultrasound report.

**Results:** Our findings suggest that echo-lucent material, non-compressibility and absence of pain at compression are always present after foam sclerotherapy and they should be always looked at DUS after foam sclerotherapy. Our group suggests that the combination of these characteristics should have a universal name: the post-foam Sclerotherapy Sign. In addition to the post sclerotherapy sign we found that sclerotherapy should have another color in the Duplex Ultrasound report for avoiding misdiagnosis.

**Conclusions:** The post-sclerotherapy sign is a reliable tool for differentiation between acute vein thrombosis and foam sclerotherapy. Searching for the characteristics of the sign in post-procedural Duplex Ultrasound could help other physicians to make an accurate diagnosis and avoid misunderstandings. Foam sclerotherapy should have a special color codification in the Duplex Ultrasound report in order to differentiate it from other diagnosis.

**Ultrasound estimates of the ejected volume in the calf muscle pump**

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**Background:** A simplified model of the calf muscle pump (CMP) and the Vascubal manoeuvre (VA), evoking considerable centripetal flow in leg veins, were assessed to evaluate the CMP by Duplex ultrasound (DUS). The model assumes that the gastrocnemius veins (GVs) provide a CMP global estimate. The ejected volume (EV) is the calf expelled blood during VA. The aim of our work was to assess the CMP EV through two measuring methods.

**Methods:** 7 consecutive patients with and without venous disease (13 lower limbs, 3C, 7C, 12C, 1C), underwent DUS+VA and the EV of CMP was measured by means of two different methods:

1st method: **EV-velocimetry-estimate (EVv)** in the popliteal vein (PV), through the cross-sectional area times the mean velocity and the time-length of the signal.

2nd method: **EV-geometric-estimate** in the CMP (EVg).

GVs volume was computed from multiple cross-sectional areas and lengths of GVs segments.

By DUS imaging the GV’s vertical extension (PL) and their contraction length (CL) were measured. The **EV-geometric-estimate** in the GVs was computed multiplying the GVs volume by the CL/PL ratio. Multiplying then by the areas ratio PV/GV, the last estimate was reported to the popliteal vein, **EVp**.

Dividing estimates from both methods by the weight, the analogous values wEVv and wEVg in ml/Kg were finally got.

**Results:** Data collected (mean±standard deviation) were the following: EVv = 30±40 ml, wEVv = 0.5±0.5 ml/Kg for velocimetry; EVg = 14±13 ml, wEVg = 0.22±0.18 ml/Kg for the geometric method.

Regression analysis provided the following relationship: wEVv = 2.82 x wEVg – 0.12, where the (non-dimensional) regression coefficient 2.82 was a constant conversion factor between the two methods. The correlation coefficients was 0.90, while the explained variance was 81%.

**Conclusions:** Two methods were assessed to estimate the CMP EV: the simpler velocimetry method and the more time consuming geometrical method; the EVg of CMP may be employed in a comprehensive CMP study. Both methods measured the same blood volume up to a multiplying factor and showed their internal consistence. Validation of these DUS-based methods vs. air plethysmography is the necessary next step.

**The non-dimensional flow-length number in ultrasound venous hemodynamics**

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**Background:** The Buckingham PI theorem, generally used for the non-dimensional analysis in fluidodynamics, was adopted to find a meaningful non-dimensional number for venous hemodynamics, named the “Flow-Length” (FL).

**Methods:** FL was defined as the mean velocity (vmean) multiplied by the time length of flow (T) and divided by the diameter of the vessel (d). FL = vmean / dFL answers to the question: how many diameters did the fluid cover in the time length of flow? FL was compared to other well-known non-dimensional numbers as the Froude (Fr) and the Reynolds (Re) numbers. Both numbers have critical points, Fr1 and Re 3000, which are threshold values to enter a different flow regimen. 9 consecutive patients (3M 6F) signed an informed consent to undergo non-invasive measurements during an ordinary ultrasound examination for symptoms of venous origin. Measurements were performed on 13 lower limbs (5 mono, 4 bilateral, 1C0 8C2 2C3 1C5 1C6) on the common femoral (CFV) and popliteal (PV) veins (11CFV, 13PV), gathering the symptoms of venous origin. Measurements were performed on 13 lower limbs (5 mono, 4 bilateral, 1C0 8C2 2C3 1C5 1C6) on the common femoral (CFV) and popliteal (PV) veins (11CFV, 13PV), gathering the symptoms of venous origin. Measurements were performed on 13 lower limbs (5 mono, 4 bilateral, 1C0 8C2 2C3 1C5 1C6) on the common femoral (CFV) and popliteal (PV) veins (11CFV, 13PV), gathering the symptoms of venous origin.
extrapolating the used data out of the range to preview the FL critical points corresponding to Fr and Re. A null intercept constraint was set in both analyses.

**Results:** CVFs PVs were all healthy veins, without diastolic reflux. Other results: Area=1.630.13 cm², d=1.410.06 cm, vmean=11030 cm s⁻¹, T=1.30.2 s Fr vs. FL showed a strict linear relationship: Fr=0.031 FL. R=0.62. FL critical point ~32 for Fr=1. Re vs. FL: Re=48.08 FL, while R=0.65. FL critical point ~62 for Re=3000.

**Conclusions:** Theoretically FL has a similar structure than the Froude number, thus the observed linear relationship FL has a much simpler mathematical expression than Fr and Re and could be used as a substitute of Fr, adopting 32 as critical value to quick flow, and Re using 62 as critical value to a turbulent regimen.

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**New ultrasound criterion for differentiation between GSV and AASV**

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**Background:** To find new ultrasound differentiation criteria between GSV and AASV, in cases where AASV substitutes hypoplastic GSV.

**Methods:** 118 varicose limbs with dilated single saphenous trunk (SST) joining SFJ were selected following the results of duplex ultrasonography. SST positioning relative to the deep femoral vessels axis was determined in transverse ultrasound scan. The length of SST was determined by a six-point scale, where one point equaled one third of the thigh or leg length. SST upper posterior-medial tributary (UPMT) was found and the distance from its entry to SFJ was identified.

**Results:** In 52 (44.1%) cases SST was positioned medially to the deep femoral vessels axis and was identified as GSV, in 55 (46.1%) cases – over the deep femoral vessels and was identified as AASV. In 11 (9.3%) cases SST was in-between, which prevented its unambiguous identification. No significant difference was found between the total lengths of GSV and AASV. SFJ to UPMT segment length comprised 56.9±19.8 mm for GSV and 15.1±7.0 mm for AASV (P=0.00001). We propose using the segment length between SFJ and UPMT as a SST differentiation criterion: the trunk would be defined as AASV at values beyond 40 mm and as GSV at larger values. Thus, we defined the SST in the group with SST in-between position as GSV in 6 (5.1%) cases and as AASV in 5 (4.2%) cases.

**Conclusions:** SFJ to UPMT venous segment length allows distinguishing GSV from AASV in cases of upper GSV hypoplasia and is clinically valuable in 9.3±2.7% cases.

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**Ultrasound evaluation of distance variation in tributaries at the saphenofemoral junction**

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**Background:** Surgical treatment of saphenous vein insufficiency depends on the adequate treatment of the saphenofemoral junction, both in stripping and in endoablative techniques. In the endoablative techniques, inadequate treatment of the saphenofemoral junction can lead to complications such as deep venous thrombosis, endoheat induced thrombosis or recanalizations. The guidelines recommend initiating ablation of the large saphenous vein 1 cm distal from the confluence with the superficial epigastric vein or 2 cm distal from the saphenous femoral junction when the epigastric vein is not visualized. However, some groups defend the thermoaablation of the great saphenous vein from point 0 of the saphenofemoral junction (laser crossectomy).

**Methods:** 62 patients (119 saphenofemoral junction) submitted to ultrasound evaluation of the venous system were included in the study. All patients underwent complete duplex examination of the venous system. Saphenofemoral junction diameter, as well as the distance from the first tributary to the common femoral vein in the anterior and posterior walls of the great saphenous vein was measured in horizontal dorsal decubitus and in orthostasis.

**Results:** Out of 62 patients, 15 were male and 47 were female. The mean age of patients was 49.73 (range 25 to 97 years). In the horizontal dorsal decubitus position, the median diameter of the saphenofemoral junction was 0.52 cm (range 0.21 to 1.17 cm), the mean distance from the first tributary in the anterior wall was 1.06 cm (range 0.32 to 2.38 cm) and the posterior wall was 0.54 cm (range 0 to 1.52 cm). In the orthostasis position, the mean diameter of the saphenofemoral junction was 0.60 cm (range 0.28 to 1.63 cm), the mean distance from the first on the anterior wall was 1.26 cm (range 0.39 to 2.83 cm) and the posterior wall was 0.68 cm (range 0 to 2.25 cm).

**Conclusions:** The optimal point of ablation of the saphenofemoral junction is still unknown, in order to avoid complications such as deep venous thrombosis, EHIT or recanalizations. The better understanding of the crossa tributaries and their relation to the patient’s posture may help us to better treat the saphenofemoral junction.
LYMPHATIC

What about the lymphatics?
Neil Piller
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Background: To increase awareness of the importance of the lymphatic system during venous system intervention.

Methods: Descriptive account of the lymphatic system and its association physically and functionally with the venous system.

Results: Veins and Lymphatics Drain the tissues. Specifically the lymphatics carry wastes, large molecules, inflammatory mediators, cytokines, adipogenic factors and fluids. Everything that leaks from the vascular system is taken up and removed by the lymphatics. There is little or no re-absorption into the venous system - except within the lymph nodes (if they are present). Each persons lymphatic system is unique, structurally, positionally and functionally. Our lymphatic systems often are nothing like those seen in stylised diagrams in text books as recent imaging studies with ICG have shown. We know those who develop lymphoedema their lymphatic system may already be working at or near capacity or may not have a great pumping pressure even prior to interventions such as cancer treatment. The reason is an underlying primary component to many apparently secondary lymphoedemas. We also know many lymphatics are located within/near the major veins (adventitial/periadventitia) and near the deep fascia. We are aware that lymphatic system dysfunction leads to lymphoedema, starting initially as a fluid accumulation and progressing through fatty and fibrous stages. We know lymphoedema is a chronic inflammatory process and we are all aware of the impact of this on cell health.

Conclusions: We often still ignore the presence and critical role of the lymphatic system and of how minimising damage to it and optimising its function can gain better patient outcomes when the venous system is in failure. We must recognise the critical role of the lymphatics, attempt to visualise and protect them during any venous system intervention. We must also look at improving lymphatic system function when the venous system is dysfunctional. We must work together side by side as are the lymphatics and veins with a target of holistic assessment and followup care.

Self care for filarial lymphoedema in remote locations
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Background: While India’s Program for Elimination of Filariasis (PELF) is showing success of Mass Drug Administration (MDA), the accompanying Morbidity Management Program - which entails treatment for those having Lymphoedema has still to deliver. We have been attempting to provide mass training for patients with Lymphoedema in Rural areas whereby they shall take care of their affected limbs themselves through leg washing as well as self bandaging

Methods: The video will demonstrate imparting instructions to patients during a camp held in 2015 in a community Health Center located in Sitapur district, Uttar Pradesh India. Over 50 patients were initially assessed for disease staging, asked to wash, given Penicillin and then provided bandage sets with demonstration of how to tie the same. Later follow-up showed results little different to those who were managed in a tertiary care hospital. Repeat camps are being conducted now in other areas.

CDP and pharmacological therapy in lymphoedema complex and complicated patients
Domenico Corda

This work is based on our experience that’s the treatment of lymphoedema out-patients. Since 2000 our teams have been treating patients with elephantiasis complicated by serious cutaneous lesions caused by infections which for the large part are bacterial infections and occasionally are fungal infections. In general, infections in these patients are chronic and manifest in two ways:

a. persistent chronic subclinical infection.
b. persistent chronic subclinical infection with intermittent flare-ups.

As we know lymphoedema is a chronic disease of Extra Cellular Matrix (ECM). In chronic and fibrotic lymphoedema, nutrients and drugs’ diffusion through the ECM is limited by the closure of pre-lymphatic channels. The lymphatic stasis produces a chronic inflammation that become a optimum pabulum for bacteria; several acute and recurrent infections appear until chronic persistent infections. When we encounter these lesions, we carry out a skin swab and sometimes a biopsy to investigate whether there are micro-organisms or because we suspect there may be a malignant/cancerous degeneration. Very rarely, with these tests, we find streptococcus and occasionally staphylococcus. What we do find is myriad types of bacteria, often originating in the intestines. This information is in line with an extremely interesting study carried out some years ago by Professor Olzewski, in which he demonstrated the presence of numerous and assorted bacteria in tissues affected by lymphostasis. In lymphoedema patients we must also consider that they are generally immunosuppressed, at least at a locoregional level. Many of these patients have been treated in infective disease units without, however, permanent or resolvent results. These patients are not generally treated by lymph-therapy services precisely because they present serious lesions and infections. We know that lymphostasis blocks correct circulation of nutrients in the extracellular matrix. Without CDP and above all without compression therapy the interstitial stasis is not reduced. In 19 years we have treated about 600 lymphoedema patients in stage 3 (according to ISL lymphoedema clinical stadiation) with their infections and with their cutaneous complications. The association of CDP and pharmacological therapy is a silver bullet. Above all, compression therapy leads to the reduction in interstitial lymphatic hypertension and the resumption of an improved circulation of substances in the extracellular matrix, be they antibiotics, anti-inflammatory, lymphotropic medication such as meliolutus and other substances. In the last twenty years, CDP and Pharmacological therapy permitted the healing of the wounds, the healing of the infection with the reduction of their relapses and the maintenance of the decongestion with a recovery of a normal tissue trophism.

Lymphoedema: a holistic approach
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Background: Lymphoedema results when the collection and return of lymphatic fluid is inadequate to keep up with production and distribution. Traditional treatment has centred on reducing accumulation of fluid by compressing the limb and speeding drainage by manual manipulation of tissues and lymph nodes. There are very few medications that can speed the removal of lymphatic fluid but proteases such as Bromelain can contribute to breakdown of proteins in lymph to assist in its fluidity and some herbs can decrease vessel permeability, decreasing lymph leakage into tissues.

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These include dietary and lifestyle factors which are not necessarily intuitive therefore good explanation and assistance to patients is required. Methods: In recent years more attention has been paid to methods to decrease production of lymphatic fluid and this seems to be an extremely useful adjunct in lymphoedema management. There are many factors influencing fluid production that have been hitherto ignored but many of these are within the patient’s control.

Results: Review of the literature reveals that education for patients with lymphoedema can be expanded to include advice regarding how to minimise fluid production via the gut, where the greater proportion of the lymphatic system resides, through reducing the load of long chain fatty acids and other chemicals that require significant metabolism, as well as those chemicals that are inflammatory in nature. Furthermore improving the function of the immune system (also overrepresented in the gut) and cellular metabolism may reduce fluid production.

Conclusions: Lifestyle modifications, especially dietary changes, have been shown to be of value in optimising the management of lymphoedema.

Towards an ideal pump for lymphoedema
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Background: Pumps for Lymphatic and Venous problems have had a chequered history. A few find it to be an essential component of every patient’s routine, while some consider them as dangerous and never to be used. Working with pumps for over 37 years, we summarise our outcomes. Based on these we discuss what we feel could be the ideal pump. Study Objectives: To assess short (<7 days) and long term (>15 days) results from different compression therapy options including pumps.

Methods: Non-randomized retrospective study of outcomes collated from EMR. Patients were classified to three groups based on the compression mode provided at the clinic. These were
A. Simple pump, MLD, crepe bandage and stockings, (Before 2010)
B. Simple pump and short stretch bandages (2011-2013)
C. Slow cycle sequential pump and short stretch bandages. (2014-2016)

All patients received counselling, skin care and antibiotics especially long term Benzathine Penicillin. Continued home care was emphasized but not all could afford purchase of pump especially the more expensive sequential one.

Improvements criteria was change in percentage Limb Volume in comparison to normal besides attacks of ADLA and general features.

Results: Total 543 patients in database. Short term results available for 161 and long term for 87 (average follow-up of 6 months). Group C outcomes significantly better than Group A in the short term. No significant difference between long term outcomes which averaged 60%. All recurrences and less than ideal outcomes were related to poor adherence to continued selfcare at home. Managing and preventing infection is more important than compression. Some complications due to incorrect use of pumps and bandages were noted.

Conclusions: Long term home care is the key to Lymphoedema management where garments, bandages and pumps - all have a role. Sequential pumps work better than simple pumps but safety as well as costs are a hindrance. Time settings may vary as per individual needs, but most pumps are relatively inflexible. We did not find problems related to high pressures.

Effects of intermittent pneumatic compression treatment on clinical outcomes and biochemical markers in patients at low mobility with lower limbs oedema: a pilot, randomized, controlled trial.
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Background: Aim of this study was to evaluate the effects of intermittent pneumatic compression (IPC) on patients at low mobility affected by oedema of the lower limbs.

Methods: A pilot, single blinded, randomized, controlled clinical trial was performed. Sixty patients (age=58.4±9y.o.; males, N.=14) were randomly allocated in a group undergoing one-month period of an in-home cycle of IPC and in a control group (C). Legs oedema was evaluated by measuring: i) Sub-cutaneous thickness (SCT) ii) Circumferences (Cir) iii) Volumes (V). Ankle range of motion (ROM), Quality of Life (QoL) and pool of plasma inflammatory markers (PIM) were also assessed.

Results: SCT and Cir significantly improved in IPC group compared to C (P<0.0001 and P<0.001). A significant improvement was reported in IPC group Volume (P<0.0001), differently from the C, where a significant increase was reported (P<0.0001). Following the oedema decrease, a significant improvement in ROM was detected in IPC group (P<0.0001). As for the QoL, only the IPC group showed a significant improvement with regard to physical activity (P<0.05), general health (P<0.004), vitality (P<0.02) and mental health (P<0.01). For PIM in the IPC group a number of differences of statistical significance were revealed (G-CSF, IFN-a2, IFN-g, IL-17, and VEGF). G-CSF was significantly reduced in the IPC group (P<0.03) while in the C it had an opposite attitude.

Conclusions: In a sample of patients at reduced mobility with legs oedema, IPC treatment was effective in reducing the oedema, improving the ankle ROM and in determining a positive impact on QoL together with a modulation of some PIM.

Extreme lymphoedema of the lower extremity
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Background: Over the last period of time we have seen an overproportionally high number of patients with a morbid lymphoedema in our clinical practice. This rise can be explained by an increase of heavily obese patients over the last years. Due to low self-esteem, these kind of patients present mostly at a late stage of disease with multiple life-threatening complications, demanding an interdisciplinary and cost-intensive therapeutic approach.

We want to illustrate our therapeutic regime by the example of three patients from our clinic with secondary lymphoedema, stage III-IV, of the lower extremity. Although our surgical colleagues suggested the amputation of the leg as sole therapeutic solution, we managed to reach a stable result with our complex, part conservative, part surgical approach. By that we prevented an amputation despite multiple intersticient complications with partial the necessity of intensive care treatment. We were able to discharge our patients with a newly gained self-confidence finally freed from social isolation.

Conclusions: Hence, lymphoedema patients are a challenging patient group demanding an interdisciplinary care team. Through our treatment approach with an interdisciplinary complication management, the patients’ wish of preventing an amputation could be fulfilled.
Treatment of patients with severe lower limb lymphedema

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Background: The aim of our study was to improve treatment results in patients with severe lower limb lymphedema by using complex treatment based on a detailed study of lymphedema pathogenesis.

Methods: Department of Surgery of Major Vessels has an experience of treatment of more than 800 patients with different types of lower and upper limbs lymphedema, in 197 of the patients severe forms of lymphedema were diagnosed. Severe forms of lymphedema were characterized by bad results of conservative treatment caused by severe fibrosis of the skin and subcutaneous tissue.

Patients underwent an ultrasound examination (US) of the lower extremities and radionuclide phlebolymphography.

Results: Approaches and methods of treatment depended on the type of lymphatic system lesions and the time interval. In 1989-2000 the main treatment method was a comprehensive approach with a focus on surgery, including the lymphovenous and nodulovenous anastomosis formation and resection plastic operations. In 2000-2016 the differentiated approach in treatment with lipo-fibroaspiration and reconstructive surgery. Complex treatment of lymphedema included lymphatic drainage and compression treatment. Satisfactory results were obtained in 74% of patients.

Conclusions: Lymphedema is associated with irreversible changes in the lymphatic system, and it is difficult to develop radical treatment, so further research in this complicated problem is needed.

Lymphangitis and cellulitis in venous insufficiency C E A P C6

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Background: Infectious Lymphangitis occurs when bacteria or viruses enter the lymphatic channels. They may enter through an injury, wound or from an existing infection.

Background: Female of forty-one years old with a medical history of morbid obesity, Chronic Venous Insufficiency diagnosed 11 years ago, right D.V.T. 8 years ago and right venous ulcer with 6 years of evolution associated with depressive disorder.

Started with the current condition one year ago with the progressive increase in volumen in lower limbs. Since six months with pain and increased right perimetry associated with Ulcer in the leg, yellow secretion and bad smell. In the last three months with a higher increase in volumen in the lower right limb in addition to a second ulcer with purulent and fetid secretion that causes immobility.

I came as a second medical opinion because another colleague had offered to treat it only with a radical disarticulation. I found a patient with BMI 58, segment pallor, fever, lower limbs with phleboedema, lymphedema, asymmetric perimetry of right predominance with 103/97/53 centimeters, lymph nodes, two huge ulcers in the leg, abscess in heel, necrosis and abundant fetid secretion.

Received treatment with antibiotics, anti-inflammatory, anticoagulation, surgical debridement, abscess drainage and compressive therapy.

Conclusions: It was possible to reduce perimetry by more 60% and infection’s control during 9 days intra-hospital treatment and outpatient management with elastoscompress and deambulation, obtaining total cicatrization in 71 days. Following considering the elastoscompressive therapy as the best therapeutic strategy in Lymphatic and Venous disorders.

The significance of a questionnaire of quality of life for evaluation of the efficacy of treatment in patients with secondary lymphoedema

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Background: This study surveys the quality of life of patients with secondary lymphoedema of the upper extremity and the overall development of their treatment. It presents a short overview of the current state of this problematic, the anatomy of the lymphatic system, the etiology of lymphoedema and its treatment and also focus on the issues of breast carcinoma. The questionnaire of the quality of life and its repeated completion may undoubtedly serve as a guideline for the improvement of the therapeutic process in patients with secondary lymphoedema of the upper extremity.

Methods: The main goal of this study was to select a suitable and in clinical practice easily feasible questionnaire for the evaluation of both partial and definite effects of the complete decongestive therapy after mastectomy. The questionnaire of choice for obtaining required data for the statistic analysis became the British Keeley Lymphoedema Quality of Life Tool comprising 21 questions.

Thus study has an Ethic Approval from local Czech authorities.

Results: A randomized group of 30 patients treated in the Center for Dermatologic Angiology in Prague with secondary lymphoedema of the upper extremity was chosen for this study. Statistically analyzed and evaluated data from the questionnaire confirmed anticipated goals and hypothesis.

Conclusions: Based on our results we can conclude that The British Keeley Lymphoedema Quality of Life Tool proved to be a suitable and easily applicable tool for determining the effect of decongestive therapy in patients with secondary lymphoedema of the upper extremity.

In our hands this questionnaire seems to be a very important part of the complex evaluation of the lymphoedema treatment. In fact, the mere measuring of circumferences of the extremity did not in any way reflect either aesthetic effect nor improved physiological function of treated subjects.
ENDOVENOUS INTERVENTIONS AND SURGERY

Laser crossectomy: 10 year results

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Background: The original description of varicose vein laser surgery recommends to leave a 2 cm long SFJ patent. Our aim was to close the SFJ or to leave a shorter stump.

Methods: 1483 saphenous vein varicosities were treated. The diameter of the saphenous veins (GSV 82.8%, SSV 12.5% and AASV 4.5%) was between 4 and 32 mm. VCSS 6.3.

The tip of the laser fibre was placed near the SFJ: in the first year 2.0 cm, later 1.0 cm and in the last 4 years 0.5 cm from the femoral vein. In these cases, more cold tumescent solution (10 ml/cm) was injected around the 3 cm long SFJ part than around the peripheral GSV (5 ml/cm). The aim of this greater amount was the more complete compression of the junction. LMWH was given to every patient for 5 days.

Results: Using this modified method, in 61% of the cases occlusion of the SFJ was flush with the femoral vein. With this technique our early recurrence rate dropped from 13.8 to 0.6% in the first 2 years. In 58% (861 cases) the operated legs could be followed for longer than one year (mean 3.5). Recurrent varicosity was found in 92 cases (10.7%).

Conclusions: Laser treatment of the SFJ near the femoral vein seems suitable in any varicose vein case and results in a lower recurrence rate.

Pattern of thermal spread and charcoal formation from rfITT endovenous catheter using continuous and pulsed energy: using a porcine liver model

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Background: Endovenous thermal ablation is the treatment for varicose veins arising from truncal reflux. The aim was to investigate the pattern of thermal spread from an RFITT catheter at different powers, and to contrast the thermal spread of continuous and pulsed energy.

Methods: An RFITT catheter was placed on the surface of the liver, with saline, under glass following our previous protocol\(^1\). The catheter was set at a power of 8, 10, 15, 20 and 25W and allowed to heat the surrounding liver continuously until a total of 150 was achieved. Thermal spread was recorded using burst photography at 5fps and area calculated using mapping software. The model was repeated pulsing the energy 1 second on 5 seconds off at 8W until 150J was delivered.

Results: Thermal spread was compared against the energy delivered. Increasing power led to an increased rate of spread. Heating continuously at 8W and 10W, with the same energy resulting in a smaller area suggesting some cooling effect. Pulsing caused reduced thermal spread compared to continuous energy, plateauing at 150J. Carbonization was only found at power over 10W.

Conclusions: 8W and 10W power do not form charcoalization but show a lower rate of thermal spread and lower total area of ablation. As no carbonization was observed, this reduced thermal spread may be optimal in practice, because of reduced sticking of the catheter. These results, and repeating this with other devices, will help to guide optimal power levels for other thermoablation devices in the future.

The hedgehog technique: early results of thermoablation treatment of complex, recurrent neovascularized vein segments using multiple ultrasound-guided access cannulae

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Background: Neovascularization is a contributory cause of varicose vein recurrence. Treatment is challenging because of segment tortuosity and fibrous web formation. Surgical re-exploration and ultrasound-guided foam sclerotherapy (UGFS) are invasive and of limited effectiveness. We propose thermoablation as an alternative using a modification of a technique originally intended for treatment of perforator vein reflux.

Methods: The technique is based on a previously described method for access and treatment of refluxing perforators\(^1\). Single or multiple vein segments identified by B-mode ultrasound in a parasagittal plane are accessed using a suitable intravenous cannula. A Luer-Lok cap is placed over the cannula hub to prevent backbleeding. As many segments as possible are cannulated until all have been accessed. The confined area can then be inflated with copious tumescent local anaesthesia to avoid segments becoming obscured during treatment if accessed individually. Endovenous Laser Ablation (EVLA) is then performed via each cannula delivering 70-80 J/cm linear endovenous energy density to each segment.

Results: Eighteen patients have been treated to date; 15 groin, 2 thigh strip track, and one popliteal fossa recurrence. Three required a single segment puncture, five had two, four; three, four cases had four punctures and two, five. Follow-up range is 1-38 months, all segments are closed and there have been no significant complications.

Conclusions: Re-exploration surgery is invasive, difficult and fraught with complications. UGFS is therefore appealing but unreliable in view of the difficulty in post procedural compression especially in the groin. Our preliminary results suggest that EVLA is a reliable alternative technique.

Endovenous laser ablation of the saphenous veins more than 2 cm of the diameter

Denis Borsuk, Alexey Fokin
South Ural Medical University, Chelyabinsk, Russian Federation

Background: The aim of this study was to investigate the results of endovenous laser ablations (EVLA) of the saphenous veins more than 2 cm of the diameter.

Methods: Prospective noncomparative study includes 112 patients who were operated from November 2014 until September 2016 and they had 126 EVLA of the great saphenous veins (GSV). We used tumescent anaesthesia, 1470 nm laser, radial fibers and special pull-back device. The diameter of the veins close to sapheno-femoral junction was from 21 to 43 mm (mean 26±4,3 mm). In all cases we used the power of 6-10 Watts. The linear endovenous energy density in dilated segments was from 83,3 to 142 J/cm. The observation period was from 67 to 440 days (mean 178±37 days). The patients had ultrasound examination the next day, a week later and after 2 and 6 months.

Results: The next day after EVLA 107 (84,9%) of the veins were occluded. In 19 (15,1%) cases the rest lumen in dilated segments was found but it was closed in 15 patients after 7 days. In 4 (3,1%) cases we did
ultrasound-guided foam-form sclerotherapy (UGST). Only in 1 (0.8%) case we found recanalization with pathological reflux. This patient was treated by UGST. There was no necessary to retreat patients by EVLA.

Conclusions: EVLA 1470 nm by radial fibers are really effective also for the veins of the diameter more than 2 cm. We have found occlusion of GSV of 99.2% cases in early follow-up period. In 3,1% of cases UGST has been done.

Dose finding study of laser energy and denaturation of the vein wall during endovenous laser ablation
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Background: Purpose of this study to determine which dose of laser energy can completely destroy the vein wall during EVLA with 1470 nm diode laser and radial fibers. We performed EVLA in patients with S-type of incompetent GSV. Just after EVLA of GSV we took small segment of extravascular vein with miniphlebectomy for examination. We used laser 1470 nm and radial fibers, automatic fiber pull-back. We included 61 patients (F=38, m=23), mean age 44.5±11.8y in this study and collected 67 venous segments. Diameter of veins was 6.4±1.2 mm (range 4.0-9.8). We used continuous mode with power 5.7±1.7 W (range 2.9-11.5), pull-back speed 0.7, 1.0 and 1.5 mm/sec, LEED 78.4±21.9 J/cm (range 40-150), EFE 39.9±13.1 J/cm² (range 20.5-95.5).

Methods: After miniphlebectomy we performed microscopy and macroscopic evaluation of inner and external layers of the veins. We observed such signs of the vein damage like gummy consistency, thickened wall, reduced caliber, veins lost typical pink color and appeared grayish-white color (external layer) or white color (inner layer). In cases of complete laser damage these changings were uniform, widespread and constant around the whole vein wall circumference. In cases of insufficient severity of these signs, we considered that damage of venous wall was incomplete.

Results: LEED. 1 group LEED ≤60 J/cm, (median 57 J/cm) 17 veins: incomplete damage of venous wall was in 13 cases, complete only in 4 cases. 2 group LEED 61-80 J/cm, (median 71,4 J/cm) 22 veins: incomplete damage of venous wall was in 7 cases, complete in 15 cases. 3 group LEED >80 J/cm, (median 89,9 J/cm) 29 veins: complete damage of the vein wall was observed in all cases. (X²=29.6, P<0.01).

EFE. 1 group EFE <30 J/cm² (median 26,4 J/cm²) 14 veins: incomplete damage of venous wall was in 12 cases, complete only in 2 cases. 2 group EFE ≥30 J/cm² (median 40,9 J/cm²), 53 veins: incomplete damage of venous wall was in 8 cases, complete in 45 cases. (X²=26,38, P<0.01). We didn’t observe any difference between different types of laser fibers in all energy groups.

Conclusions: For complete damage of venous wall during EVLA 1470 nm with radial fibers it is necessary LEED more than 80 J/cm and EFE – more than 30 J/cm².

Comparison of 1470 nm laser and radial 2ring fiber with 1470 nm laser and radial fiber in endovenous laser ablation of saphenous varicose veins
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Background: The aim of this study is to compare the clinical efficacy and safety of two laser fiber types in endovenous laser ablation (EVLA) of saphenous varicose veins of the lower limb.

Methods: From January 2013 to September 2015, 94 patients (94 limbs) with primary varicose veins were randomized into two groups. They were treated with radial fiber and 1470 nm laser in Group 1 (46 limbs) and radial 2ring radial fiber and 1470 nm laser in Group 2 (48 limbs) in order to ablate the saphenous vein. Vein occlusion rates at 1 and 7 days, and 1, 3, 6 and 12 months and incidence of pain in treated region were recorded as primary efficacy and safety endpoints. Postoperative pain, venous clinical severity scores (VCSS) postoperative bruising, adverse events following endovenous laser ablation with both fiber types were recorded as secondary endpoint.

Results: Occlusion rates at 1 day were 100% in both groups, at 7 days, and 3,6 and 12 months were 97.9% in Group 1, and 100% in Group 2. Rates of pain (3% vs. 14.8%) were lower in Group 2, but not significantly. The maximum VAS in Group 1 and 2 were 6.4±8.4 and 20.5±17.6, respectively, showing a significant difference (P<0.001). VCSS scores were significantly better in Group 2 at 1 day and 1 week (P<0.001). At 3, 6 and 12 months, no significant differences between the groups were evident.

Conclusions: Endovenous treatment of saphenous vein reflux with either fiber types results in clinical improvement of symptoms and comparable occlusion rates. In the early postoperative period, 2-ring fiber laser seems to remove quality-of-life limitations associated with conventional radial fiber.

Controlled ultrasound-guided tumescent anaesthesia in endovenous laser therapy: comparative study of an original technique with directed hydro-separation approach
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Background: One of the most widely used modern techniques is Endo-venous Laser Ablation EVLA. There is no consensus in the literature neither on the technique, nor on the optimal volume of Tumescent Anaesthesia TA used in EVLA. We aimed to define and assess a new technique of tumescent infiltration and evaluate its influence on perioperative pain and on the volume of TA.

Methods: A prospective comparative study was performed to assess the short-term efficacy and safety of an original technique of tumescence. 102 patients with duplex confirmed Great Saphenous Vein insufficiency were randomized into two groups. They were treated with radial fiber and 1470 nm laser in Group 1 (46 limbs) and radial 2ring radial fiber and 1470 nm laser in Group 2 (48 limbs) in order to ablate the saphenous vein. Vein occlusion rates at 1 and 7 days, and 3,6 and 12 months and incidence of pain in treated region were recorded as primary efficacy and safety endpoints. Postoperative pain, venous clinical severity scores (VCSS) postoperative bruising, adverse events following endovenous laser ablation with both fiber types were recorded as secondary endpoint.

Results: Occlusion rates at 1 day were 100% in both groups, at 7 days, and 3,6 and 12 months were 97.9% in Group 1, and 100% in Group 2. Rates of pain (3% vs. 14.8%) were lower in Group 2, but not significantly. The maximum VAS in Group 1 and 2 were 6.4±8.4 and 20.5±17.6, respectively, showing a significant difference (P<0.001). VCSS scores were significantly better in Group 2 at 1 day and 1 week (P<0.001). At 3, 6 and 12 months, no significant differences between the groups were evident.

Conclusions: Endovenous treatment of saphenous vein reflux with either fiber types results in clinical improvement of symptoms and comparable occlusion rates. In the early postoperative period, 2-ring fiber laser seems to remove quality-of-life limitations associated with conventional radial fiber.
Difference between morphological changes after endovenous laser ablation by radial fibers with different power but similar linear endovenous energy density

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Background: The aim of our study was to investigate the depth of venous walls’ damage after endovenous laser ablation (EVLA) using different power as 5, 7 and 10 Watts but the same linear endovenous energy density (LEED) which was approximately 70 J/cm.

Methods: Prospective comparative morphological blind study included 30 patients whose great saphenous veins were treated by EVLA 1470 nm by radial fibers. The patients were divided into 3 groups for 10 persons. In the 1st group patients were treated by EVLA with power 5 Watts with speed of the fiber traction 0.7 mm/sec (LEED 71.4 J/cm). In the 2nd group the power was 7 Watts with traction speed 1 mm/sec (LEED 70 J/cm). And in the 3rd group the power was 10 Watts and speed of the traction was 1.5 mm/sec (LEED 66.7 J/cm).

Results: The mean depth of the venous walls damage was 122.9 µm in the 1st group, 182.9 µm in the 2nd group and 267 µm in the 3rd group. The coefficient of alteration (relation of the damage depth to the venous walls’ density) which was approximately 70 J/cm.

Conclusions: Having used more power (from 5 to 10 Watts) with EVLA at the same LEED the depth of venous wall damage becomes more significant.

Preconditions to the modification of radiofrequency ablation regimen for reducing complications of varicose veins treatment

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Background: Radiofrequency ablation (RFA) can cause the appearance of sensitivity disturbances, due to thermal damage of nerves. These consequences can be explained by the excessive thermal exposure, which goes beyond the vein walls and damages the structures, surrounding the vein. Mathematical modeling is a relevant method for this research because the RFA technology is accompanied by a temperature control in the exposure zone and is deprived of variable factors such as fiber pulling out, vessel relaxation, carbonization, and others.

Methods: An adequacy of the energy level of RFA standard temperature-time mode has been analyzed on the basis of mathematical modeling results. The differential heat equation has been taken as the basis of calculations of the propagation of heat emitted by the catheter on the vessel wall. It has been calculated using finite element method in COMSOL Multiphysics 5.1 software package. The experimental temperature dependencies on a time of the catheter surface were obtained by processing generator monitor readings video records during 30 procedures. The task of modeling the propagation of heat emitted by the catheter on the vessel wall was solved numerically using the differential heat equation. Software package COMSOL Multiphysics 5.1 was used for calculations. The temperature dependences on a time of the RFA exposure were designed for the middle (at a distance of 0.5 mm from the surface of the catheter) and the outer surface (1 mm from the surface of the catheter) of the venous wall for the standard mode of ClosureFast catheter.

Results: It has turned out that the vein wall outer surface heating exceeds 60°C at the 9th second of RFA cycle. This result evidences the energy, generated by the VeneFit device during the standard mode, becomes excessive for veins of small diameter (up to 6 mm) by the middle of the cycle. This study developed of a new energy RFA mode, providing only the effective thermal exposure on the venous vessel during the procedure to avoid undesirable damages.

Conclusions: The optimized temperature-time mode has been offered using mathematical modeling method. Clinical trials are required.
The gonarthrosis is defined as chronic degenerative disease of the knee. There are several etiologic mechanisms involved: organic causes, functional disturbances; blood flow disturbances (the arterial theory, the venous theory). The venous insufficiency may cause on the joint of the knee actions like: osteoporosis, osteophytosis and bone neoformation.

Methods: The study group - patients with gonarthrosis and concomitant varices of the GSV at the same leg. Total number of patients in the study: 19 (8 women and 11 men). Non-stripping ambulatory surgical treatment of the varicose veins was performed in all cases. During the procedures the existence of dilated insufficient genicular vein were observed in all cases; those veins were intercepted, sectioned and ligated (the reflux and hyperpressure at their level was eliminated).

Results: Spectacular improvement of the joint symptomatology: disappearance of joint pain-gonalgia (16 cases-84%); significant reduction of pain (3 cases-16%). Improvement of the imagistic appearance of the gonarthrosis 6 months after the operation without any other concomitant treatment. The complementary treatment was no longer necessary (painkillers, physical therapy).

Conclusions: The importance of the venous factor in a significant number of patients with simultaneous gonarthrosis and varicose veins on the same leg justifies the term phlebogonarthrosis. The pathway from the insufficient GSV through the joint of the knee is the insufficient genicular vein.

What is the best adjunctive treatment for superficial varices when using thermal or mechano-chemical ablation for saphenous veins?

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Thermal ablation techniques such as laser ablation and RF ablation as well as mechanochemical ablation are widely used to treat saphenous trunks and have a low recanalization rate. However, studies of recurrence after varicose veins treatment show that accessory veins and saphenous tributaries are often to the source of development of new varices. How are these best treated?

A commonly used method is to undertake phlebectomies, usually during the same session as the truncal ablation procedure. This is not normally undertaken as an ultrasound guided procedure and has the potential to leave considerable numbers of accessory and tributary veins. In addition, phlebectomy has the disadvantage that skin incision may lead to wound infection and healing problems, including scars. Collateral damage to cutaneous nerves and lymphatic vessels may also arise.

Foam sclerotherapy is also a commonly used adjunctive treatment to thermal ablation. This method has the advantage that it is normally carried out under ultrasound guidance and may be more rigorous in eliminating the accessory veins and saphenous trunks. It has the disadvantage that it may give rise to phlebitis, tender lumps and persistent skin pigmentation. The method of choice in a particular patient may depend on patient factors as well as the phlebologist's preferences.
SCLEROTHERAPY

Investigating the aetiology of telangiectatic matting
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Background: Telangiectatic matting (TM) is a morphological description referring to vessels with a small diameter of less than 0.2 mm that can appear sporadically or in well-defined patches (hence the term ‘matting’) mostly on lower limbs. The etiology underlying TM remains to be established. Our study aims to identify risk factors associated with telangiectatic matting (TM).

Methods: This study has two parts. We first retrospectively analyzed the clinical records of consecutive patients to identify risk factors for TM. In the second part, the haemostatic and coagulation profile of a subset of patients with TM were analyzed and compared with controls using standard coagulation tests, platelet function (multiplate impedance aggregometry) and a global assay of coagulation (rotational thromboelastometry, ROTEM).

Results: In 352 consecutive patients, 25 patients had TM (7.1%). All 25 patients were female with the median age of 45 (27-57) years. Significant associations included recurrent epistaxis, easy bruising, hypersensitivity (eczema, hives, hay fever, rhinitis), previous treatment with sclerotherapy or vascular laser for lower limb veins and a family history of telangiectasias. The haemostatic and coagulation profile of 12 patients with TM did not differ significantly (P>0.05) from those without TM.

Conclusions: TM is associated with hypersensitivity and a bleeding tendency. Patients with TM do not have an underlying haemostatic abnormality. Underlying mast cell hyperactivity may contribute to both hypersensitivity and a bleeding tendency and predispose patients to TM. We hope the findings of our study help tailor preventative measures and treatment modalities to control and reduce the incidence of TM.

Foam versus liquid in sclerotherapy for telangiectasia: review of literature and new perspective of a randomized clinical trial
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Background: In the sclerotherapy for varicose veins, particularly for the great saphenous vein, the superiority of foam compared to liquid has been established based on numerous studies. However, the use of foam to treat telangiectasia is more controversial. We conducted a bibliographic search on the studies comparing liquid to foam in the C1 (CEAP clinical class) with the objective of evaluating the evidence of the possible superiority of foam in this indication, and then as second objective, to propose if necessary a relevant randomized controlled study protocol. The two sclerosing agents which can be used in the form of foam and marketed in France are polidocanol (POL) or Laurumacrogol 400 and sodium tetradecyl sulphate (TDS).

Methods: We conducted our research on the Cochrane Database of Systematic Reviews, complemented by a research in various databases (Pub Med, Cochrane Library, ScienceDirect, INIST, Web of Science) and a manual search of abstracts from scientific conventions and of unrefereed journals in the databases.

Results: Only one randomized study was found in this indication, a very few other non-randomized studies were published. Several important biases were regularly found.

Faced with our “poor” research findings, we have established a multicentric randomized controlled trial comparing the liquid form and the foam form for POL and TDS in the treatment of telangiectasia. This will be a 4-arm study: 2 liquid arms (one with TDS, the other with POL) and two foam arms (same as TDS and POL), under the auspices of the SFP. The primary endpoint will be efficacy on scanned photos. 400 patients are expected to be included, 100 in each arm. 15 investigators from the SFP have been recruited.

This study is set to start shortly.

Conclusions: Our research findings have confirmed that the studies comparing foam and liquid in the sclerotherapy of telangiectasia are rare. The SFP proposes an extensive randomized multicentric study in this indication.

External vascular lasers versus sclerotherapy for lower limb telangiectases
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Background: The role of external vascular lasers in treating lower limb telangiectases remains controversial. This paper reviews the evidence for external beam laser (532nm through to 1064nm) in treating lower limb telangiectases, within the context of the author’s experience in sclerotherapy and lasers.

Methods: (1) Pubmed literature search for “lower limb telangiectases lasers”; (2) Clinical audit for lower limb telangiectases treated with energy-based devices (Intense pulse light/ vascular lasers) for patients attending the author’s private practice over the period 2018 – 2017.

Results: Pubmed search uncovered 107 citations. Reports were typically of evidence Level 3 (case control, retrospective comparative studies) and level 4 (case series, case control studies). Laser wavelengths: 532nm KTP laser, 575 - 595nm pulsed dye laser and particularly 1064nm Nd:YAG laser. The 1064nm Nd:YAG laser appears most efficacious with some reports suggesting outcome equivalence to sclerotherapy with minimal complications.

The author’s clinical audit showed lasers being mostly used in patients with peripheral or generalized essential telangiectases, post-sclerotherapy and needle-phobic patients without significant feeder vessel compromise.

Conclusions: For most patients with leg veins, sclerotherapy remains the gold standard. However, vascular lasers can be usefully considered in instances of non-feeder telangiectases, matting and progressive essential telangiectases.

The experience and cosmetic effect to treat telangiectasia and reticular veins of lower limb in China
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Background: The disease of reticular veins and telangiectasis of lower extremity are very common. Regular treatments and medicines are invalid. This research is to study the effect of the combination of scleroth-
apy and the long-Pulsed 1064nm Nd:YAG laser in treatment of reticular veins and telangiectasis of lower extremity in China. We also assessed the safety and clinical efficacy of QS-Nd:YAG laser in the treatment of pigmentation after sclerotherapy.

Methods: From January 2015 to June 2016, excluding deep and superficial veins valve insufficiency of the lower extremity through duplex ultrasonography, 136 cases with simple reticular veins and telangiectasis of the lower extremity were treated with sclerotherapy combined with Nd:YAG 1064nm laser therapy. We evaluated 70 patients with pigmentation. For every patient, part pigmentation area treated with a 1064-nm QS-Nd:YAG laser, and the left untreated area as control.

Results: Of the 136 patients: cured in 87 cases, significantly effective in 45 cases, effective in 4 cases, total effective rate is 100%. There were no severe complications in all cases. In terms of 70 patient treated with QS-Nd:YAG laser self-assessment, 80% of the patients treated with Q-switched Nd:YAG laser had excellent results compared to 17% in untreated.

Conclusions: Sclerotherapy and Nd:YAG 1064nm laser are for different stages of the treatment process and different caliber of blood vessels. A combination treatment of sclerotherapy and Nd:YAG 1064nm laser for reticular veins and telangiectasia of lower extremity is safe, simple and effective. QS-Nd:YAG laser is effective in the treatment of pigmentation after sclerotherapy.
DERMATOLOGY AND ULCERS

Early detection of venous microangiopathy by skin capillaroscopy

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Background: Venous microangiopathy is a central pathophysiological event in the development of the cutaneous complications of chronic venous insufficiency (CVI). We investigated the potential of capillaroscopy for the early detection of CVI in patients with Chronic Venous Disorders (CVD).

Methods: Capillaroscopy pictures (magnification X50, CapXview®) were systematically taken from the medial and lateral malleoli of both legs in a series of patients following a spa treatment course for CVI (CEAP «C» class 3 or more in at least one leg). Those pictures were subsequently blindly analyzed, with measurement of the capillary density, and the diameters of the capillary loops and dermal papillae and analyzed according to the CEAP «C» classes.

Results: Twenty-one patients participated: 11 women and 10 men, mean analyzed according to the CEAP «C» classes.

Methods: Capillaroscopy pictures (magnification X50, CapXview®) were systematically taken from the medial and lateral malleoli of both legs in a series of patients following a spa treatment course for CVI (CEAP «C» class 3 or more in at least one leg). Those pictures were subsequently blindly analyzed, with measurement of the capillary density, and the diameters of the capillary loops and dermal papillae and analyzed according to the CEAP «C» classes.

Results: Twenty-one patients participated: 11 women and 10 men, mean age 70.6±6.9 years, 12 of whom had a history of DVT. The CEAP «C» classes of the 42 examined legs were C0-C2: N.=17; C3: N.=10; C4: N.=5. The analysis of capillaroscopy parameters showed a reduction in capillary density (P<0.001), an increase in capillary diameter (P<0.01) and an increase in papillary diameter (P<0.001) with increasing CEAP «C» classes. For all three parameters, changes were more important at the medial malleolus.

Conclusions: These results confirm the importance and early occurrence of the venous cutaneous microangiopathy in CVI patients. Evaluation of the prognostic value of these findings requires further follow-up studies.

Non-invasive laser speckle contrast analysis (LASCA) as an alternative to biopsy in the diagnostic of angina cuts and livedovasculopathy

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Background: Introduction: LASCA visualizes tissue blood perfusion in the microcirculation instantaneously. Livedovasculopathy and Angina cuts are the painful correlate of an impaired microcirculation caused by microthrombosis of the skin capillary system, mostly localized to the feet and often accompanied by ulcers. The skin shows a typical permanent violaceous netlike pattern (Livedo racemosa) in contrast to the harmless Livedo reticularis. Skin biopsy with detection of hyaline thrombus and perivascular lymphocyte infiltration is the gold standard diagnostic tool for this rare disease (Incidence <1:100,000), but despite of biopsy the reason for microthrombosis remains often unknown.

Methods: After exclusion of makrovascular disorders 15 symptomatic patients were examined with a standardized LASCA procedure including local temperature provocations, all underwent further laboratory investigations.

Results: In all patients local perfusion deficits could be visualized by LASCA with a reliable separation from functional vessel occlusion through temperature provocations. Without biopsy the following underlying prothrombotic disorders could be elucidated: JAK2-positive (V617F) essential thrombocytosis and myelofibrosis, systemic lupus erythematoses, antiphospholipid syndrome and multiple myeloma.

Conclusions: In all current cases biopsies consciously were avoided because of eligible scruples to provoke wound healing disturbances in these non-perfused areas. LASCA is a proof method to separate organic from functional vascular deficits and allows in combination with laboratory to elucidate the reason of microthrombosis.

Assessment of grading of pigmentation in chronic venous insufficiency

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Background: Chronic Venous Insufficiency provokes cutaneous pigmentation of the leg ranging from small regions of mild dyschromia to extensive areas of severe skin darkening. Probably this pigmentation is because of Haemosiderin and melanin.

Methods: Our aim was to grade the severity of pigmentation of verity and assess that how much Haemosiderin and melanin contribute in that.

The grading was done as + Few spots, ++ Pigmentation over gaiter area, +++ Pigmentation involving leg and ankle and ++++ Heavily pigmented. A biopsy was taken from pigmented area and it was analyzed with H & E stain, Perl’s stain and IHC for S-100.

Results: Total of 100 patients of symptomatic varicose veins were analyzed of that 23 patients had pigmentation of varying grade. Three patients had +, 13 were ++, 3 were +++ and 4 were ++++. Patients with + pigmentation were clinically less symptomatic and did not have ulcer. Ulcers were present in 7 out of 13 patients, 2 of 3 +++ and all 4 patients in Grade IV pigmentation. On H&E stain about 50% showed erythrodiapedesis, 40% biopsies were positive for Haemosiderin on Perl’s stain and almost all biopsies were positive for S-100 for Melanin.

Conclusions: Severe grade of pigmentation were correlated with severity of CVI and duration of Disease and almost all biopsies were positive for Melanin deposits while Haemosiderin was positive in 40% biopsies.

Efficacy of skin care in medical compression therapy: influence of evening creaming and compression stockings with integrated skin care on the skin barrier

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Background: Monitoring of skin moisture, skin roughness, and transepidermal water loss (TEWL) of the skin at the lower limb under compression therapy in two randomized groups with and without evening creaming and compression stockings with integrated skin care.

Methods: Three randomized controlled studies were performed. 1st RCT: healthy volunteers and patients with CVD wore compression stockings, CCL 2 (23mmHg – 32mmHg). Randomization into two groups -with and without evening skin care. 2nd RCT: patients with proven CVD were recruited to test the “Balance 1” and were randomized to test the Balance 1 and MCS without skin care. 3rd RCT: Evaluation of the “Balance 2” on healthy subjects with daily standing of at least 8 hours and identified orthostatic edema. Balance 2 and MCS without skin care were worn consecutively. Measurement of skin moisture, skin roughness, TEWL.
before and after the wear period in all cohorts of all three trials. In addition, the volume of the leg was measured in two of the three RCT’s.

**Results:** Transepidermal water loss (TEWL) increased without evening skin care \((P<0.05)\). Skin moisture was improved with skin care \((P=0.000)\) and retained with application of Balance 1 \((P=0.08)\) and Balance 2 \((P=0.03)\). Volume reduction of the lower leg was achieved by means of the compression stockings in all cohorts of the three RCT’s.

**Conclusions:** The barrier function of the skin is impaired by use of compression therapy. Since skin hydration was reduced, waterloss (TEWL) was increased and the roughness of the skin was increased. Both by the application of ointment in the evening and by the use of compression stockings with integrated skin care these undesired side effects of compression stocking are prevented. Consecutive itching of the skin does not occur.

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**Tolerance of compression for ulcers in a topical environment**

Arun Rekha Gogia1, S. Gogia2

1Counsellor; 2Surgery, Sanwari Bai Surgical Center, New Delhi, India

**Background:** Analyzing efficacy and tolerance for Compression therapy for ulcers in a tropical setting.

**Methods:** Retrospective analysis of tolerance of various components of compression and care outcomes of lymphoedema and ulcer patients in India.

**Care protocol:** Patients were first assessed for diagnosis and staging. All were counselled on the treatment plan with emphasis on need of continued home care. Photographs and Circumference measurements were taken for volume assessment. Ulcer assessment was separately done as required. All were given Long term Benzathine Penicillin unless allergic.

Compression therapy choices at initiation was Multi Layer Lymphoedema Bandaging (MLLB) and Intermittent Pneumatic Compression (IPC).

**Results:** Out of 580 total patients, there were 32 with ulcers, with duration ranging between 6 months to 12 years. Size varied from less than a cm, and causing lymphorrhoea, to around 160 sq cm. All ulcers healed completely within 2 to 6 weeks except in two. One failure had deep circumferential scarring but 90% reduction of ulcer size was achieved. The only complete failure had a large weeping ulcer. The desired protocol could not be sustained due to repeated infection.

**Conclusions:** Ulcers do not affect the compression therapy protocol unless extremely large even in a tropical setting.

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**Effect of whole-course health education on dressing of patients with lower limb vein ulcer**

Qian Ning, Lin Zhang, Xiaoyan Liu, Jichun Zhao

Department of Vascular Surgery, West China Hospital, Chengdu, China

**Background:** To study the effect of holistic health education in dressing change for patients with venous ulcer of lower extremities.

**Methods:** To collect 37 patients with venous ulcer of lower extremities that had dressing change in West China Hospital of Sichuan University during June 2016 to May 2017. These patients were randomly...
divided into 2 groups. The routine group had 19 members, The control group had 18 members. The routine group carried on moist wound healing therapy and pressure treatment in dressing change with some regular health education. The control group carried on moist wound healing therapy and pressure treatment in dressing change. Besides, we promoted holistic health education in patients and their family members for control group.

**Results:** 15 patients of the routine group were cured, 3 patients withdrew, and 1 patient was failed. The day of dressing change was $83.22 \pm 9.60$ days with a total cost of 6756.32 CNY. In the control group, 17 patients were cured and 1 failed. The dressing change took $67.16 \pm 7.40$ days with a cost of 4,696.56 CNY.

**Conclusions:** The holistic health education can shorten the healing time of lower limb venous ulcer, reduce the recurrence of ulcer, improve the confidence of the patients and their family, reduce the cost, and improve the satisfaction of patients.
VENUOUS THROMBOEMBOLISM

Death from pulmonary embolism – how long does it take for heparin to become effective?
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Pulmonary embolism is a common cause of death in hospital practice. Prevention of death is dependent on early diagnosis and treatment. The main method of treatment is anticoagulation with heparin which has been shown to be effective over many years. The role of IVC filters remains to be established in this condition.

A question most commonly asked by lawyers rather than doctors is ‘How long does it take before heparin treatment will prevent death from pulmonary embolism?’ Low molecular weight heparins take less than 30 minutes to achieve an effective plasma level after subcutaneous injection. Is this sufficient to protect patients from a fatal outcome or does it take several days for this treatment to become effective?

I collaborated with the RIETE database custodians and statisticians and compiled a model to quantify the answer to this question. The information concerning the outcome of treatment in 15,002 was studied.

Two methods of analysis were used, including graphical representation of the data with calculation of regression lines. The average mortality for the patient cohort was calculated in the first 36 hours, as patients entered the registry. This was compared with mortality for days 2-7 in the heparin treated and in the patients who received no anticoagulant drug.

A graphical solution showed that the mortality in these two epoachs was identical. Standardized mortalities were also calculated for two epoachs (first 36 hours and days 2-4) using Poisson technique. For patients treated with low molecular weight heparin, mortality was numerically lower in the first 36 hours, but were not statistically different (First 36 hours, N.=96, mortality per 10,000 patient days: 32 95% CI 25-40, days 2-4 N.=97, mortality 22 95%CI 18-27). Overlapping confidence intervals show that, even in this large study, the mortality in these two period is not statistically different. All analyses indicate that the time taken between injection and onset of efficacy is less than 1 hour.

I conclude that heparin is effective in preventing death from pulmonary embolism in about 1 hour after injection.

Prospective study on the prevalence of deep vein thrombosis and incidental findings using ultrasound and D-dimer
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Background: This prospective study was designed to determine the incidence of deep vein thrombosis (DVT) and incidental findings (IF) in consecutive patients presenting with signs and symptoms of VTE. These patients were stratified into low, moderate, and high risk categories using modified Wells’ criteria. All patients received D-dimer testing and lower extremity ultrasound. All veins from the external iliac to the ankle were examined. The type and location of IFs were recorded.

Results: A total of 200 patients [400 limbs] were included. There were 79 patients (39.5%) with low clinical pretest probability (PTP), 84 patients (42%) with moderate and 37 patients (18.5%) with high. DVT was found in 28 patients [incidence 14%], 22 were unilateral and 6 bilateral. Proximal DVT was found in 12 limbs, calf DVT in 14 limbs, and both proximal and distal in 5 limbs. IFs without DVT were detected in 42 limbs while both IF and DVT were seen in 3 patients. NPV of D-dimer was 99.5% in the low PTP group, 96.6% in the moderate and 85.7% in the high. IFs explained the signs and symptoms in 80% of those with an IF and altered management in 5 patients.

Conclusions: Even in well selected patients, the incidence of DVT is low. IFs may change the management in a small number of patients and could explain the clinical presentation in a significant proportion. The majority of patients have neither DVT nor IF.

Recurrent DVT
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Background: To estimate the cumulative incidence of recurrent venous thromboembolic events after a first or second DVT and to identify possible risk factors.

Methods: Retrospective analysis of 800 patients over last 3 decades was performed. Objectively symptomatic DVT was verified clinically and with Ultrasonography. Prior to availability of CDT patient were either treated surgically or with unfractionated Heparin. Since 2001 the change in treatment modality with CDT and newer systemic and oral anticoagulants has brought up positive outcomes as and when compared to earlier methods.

Results: Over last 3 decades and transition from surgery to CDT our observations in 800 cases from single center have shown 10% recurrence rate after complete evacuation, apx. 15% PTS in cases of CDT clearance and additional medical management. Proximal DVT (relative risk [RR], 2.40; 95% CI, 1.48-3.88; P<.001), cancer (RR, 1.97; 95% CI, 1.20-3.23; P<.001), and history of a venous thromboembolism (RR, 1.71; 95% CI, 1.16.52; P<.01) predicted an independently increased risk of recurrent events in multivariate survival analysis. Postoperative DVT (RR, 0.27; 95% CI, 0.13-0.55; P<.001) and a long duration of oral anticoagulation therapy (RR, 0.95; 95% CI, 0.92-0.98; P<.01) involved a smaller risk of recurrent events.

Conclusions: Intimal endothelin-1, platelets aggregation, infection and inflammatory concepts have changed the recent thinking. The recurrence rate after a symptomatic DVT is high. Patients with proximal DVT, diagnosed cancer, oral anticoagulation therapy, or a history of thromboembolic events had a higher risk of recurrent events, while patients with postoperative or postpartum DVT had a lower recurrence rate.

Clinical scores in deep vein thrombosis: strengths and limitations
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Background: The diagnosis of deep vein thrombosis (DVT) remains challenging. Various clinical prediction rules have been developed in order to improve diagnosis and decision-making in relation to DVT. The aim of this review is to summarise the available clinical prediction scores and describe their applicability and limitations.

Methods: A systematic search of PubMed, MEDLINE and EMBASE databases was conducted, in accordance with PRISMA guidelines, using the keywords: ‘clinical score’, ‘clinical prediction rule’, ‘risk assessment’, ‘clinical probability’, ‘pretest probability’ and, ‘diagnostic score’ and Medical Subject Heading terms: ‘Venous Thromboembolism/diagnosis’ and ‘Venous Thrombosis/diagnosis’. Both development and validation studies were eligible for inclusion.
Results: The search returned a total of 2036 articles, of which 102 articles met a priori criteria for inclusion. Eight different diagnostic scores were identified. The development of these scores differs in respect of the populations included (hospital inpatients, hospital outpatients or primary care patients), the exclusion criteria, the inclusion of distal deep vein thrombosis and the use of D-dimer. The reliability and applicability of the scores in the context of specific subgroups (inpatients, cancer patients, elderly patients and those with recurrent deep vein thrombosis) remains controversial and is discussed.

Conclusions: Detailed knowledge of the development of the various clinical prediction scores for DVT is essential in understanding the power, generalisability and limitations of these clinical tools.

Trends in mortality from venous thromboembolism in Europe, North America and Australasia: 1990-2013
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Background: Venous thrombo-embolism (VTE) is an important cause of preventable death. We aimed to describe VTE mortality trends in Europe, North America and Australasia 1990 to 2013.

Methods: VTE-mortality was defined as the underlying cause of death being PE or DVT as per the International Classification of Disease (ICD) v9 and v10. Sex-specific and country-specific VTE mortality rates were extracted from the WHO Mortality Database. Age standardized death rates (ASDR) were computed using World Standard Population. Joinpoint analysis was used to identify ASDR trend changes.

Results: Overall trend for reduction in VTE mortality is observed 1990 to 2013. VTE mortality rates were higher in Europe, compared with North America and Australasia. In 2013, most countries had VTE ASDR <5/100,000/annum; Bulgaria is an outlier with an increase in VTE ASDR from 0.9/100,000 to 14.0/100,000 for males, and 0.4/100,000 to 8.9/100,000 for females. VTE ASDR increases were also observed amongst males in Latvia (1.7-fold), males (7.8-fold) and females in Lithuania (2.5-fold). Hungary saw the greatest reduction in VTE ASDR, by 89% for males and 90% for males. VTE mortality rates were similar between sexes in the majority of countries. In Bulgaria, Czech Republic, Germany, Hungary, Poland and Romania there was a consistently higher ASDR for men compared to women.

Conclusions: VTE mortality is reducing. VTE mortality reductions seen in Australasia, North American and Western Europe have not been seen in a number of Eastern European countries. Further efforts are required to understand and address higher and increasing VTE mortality rates, and gender differences in certain European countries.

Annual prevalence of mortality and early re-hospitalizations of venous thrombo-embolic diseases in all French public and private hospitals
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Background: To evaluate the annual prevalence of mortality and early hospital re-admissions (before 3 months) of venous thromboembolic diseases (VTE), deep vein thrombosis (DVT) and pulmonary embolism (PE) in all French public and private hospital

Methods: The statistics are issued from the national databases transmitted and validated by all private and public hospitals (OLS). Hospital stays were studied over the period from April 2010 to September 2011 so as to have (1) a three-month (90-day) hindsight before the start of the study period (July 2010) in order to avoid to consider early re-hospitalization as an initial stay and (2) a follow-up of 3 months after the end of the study period (June 2011) in order to be able to detect possible re-admissions of VTE occurring during the last quarter of follow-up.

Results: The results cover 170 764 hospital stays for PE or DVT in France from July 2010 to June 2011. The mortality rate during the initial stay is 6.92% for all the VTE, 4.69% for DVT without PE and 9.11% for PEs with or without DVT. The early re-hospitalizations rate is 7.94% for all the VTE, 7.92% for DVT without PE and 7.96% for PEs with or without DVT

Conclusions: This high prevalence of early re-hospitalization of VTE is questioning the effectiveness the medical follow-up that they have in ambulatory care after hospitalizations and the necessity to implement actions to better educate the patient and to raise the awareness of the general practitioners due to an increasing lack of angiologists.

The issues of recruiting to a multicenter trial in venous thromboembolism (VTE) prevention
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Background: UK venous thromboembolism (VTE) prevention recommendations state that patients at medium or high risk for VTE, should receive both pharmacological and mechanical thromboprophylaxis in the form of graduated compression stockings (GCS). The evidence base upon which these recommendations were made is weak and has been contested. A trial has been designed to clarify this issue.

Methods: Adult elective surgical patients identified as being at moderate and high risk for VTE will be randomized to receive either low dose LMWH with GCS, or low-dose LMWH alone. Follow-up will be performed at 1 week post-surgery or at discharge, and at 90 days. Routine bilateral full lower limb duplex ultrasonography will be performed between 14-21 days post-operatively to capture peak VTE incidence. To show non-inferiority (3.5% non-inferiority margin) for the primary endpoint of all VTE within 90 days, 2236 patients are required.

Results: The primary endpoint is VTE within 90 days; a composite end-point including duplex ultrasound-proven new lower-limb DVT (symptomatic or asymptomatic) plus symptomatic PE (imaging confirmed) up to 90 days post-surgery. To date 3796 patients have been screened and 749 patients have been randomized, a 20% inclusion rate (40% men; 60% women, mean age 56).

Conclusions: This study will be the first large randomized multicenter trial to compare VTE outcomes in surgical patients assessed as being at moderate or high risk and will support future policy in VTE prevention worldwide.

Correlation of various platelet indices in deep venous thrombosis
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Background: To assess the various platelet parameters in proved cases of Deep venous Thrombosis.

Methods: A total of 33 cases and 33 controls were included in this study. All patients who had proved DVT on Compression Doppler study were
included. Patients already on anti platelet drugs or anticoagulants were excluded. Samples taken were the blood and Beckmann Coulter analyzer was used to study the various platelet indices. D Dimer was also assessed.

**Results:** On comparison of various platelet indices and other parameters, total leucocyte count, RDW, Mean Platelet volume, PDW and P-LCR were found to be raised in patients as compared to controls. Correlation study revealed that MPV is directly related to PLCR and inversely related to Platelet Count. Platelet Count is directly related to PCT and PLCC. Comparison of all platelet indices between case and control showed that RDW, MPV, PDW and P-LCR were significantly raised in cases (RDW: 57.8±15.2fL vs. 43.2±3.5fL with P<0.001, MPV: 9.9±1.2fL vs. 9.1±0.9fL with P<0.004, PDW: 16.5±0.7fL vs. 15.9±0.6fL with P<0.001, P-LCR: 40.9±8.2% vs. 34.2±8.0% with P=0.001). ROC analysis of MPV showed AUC=0.664, P=0.022, cut-off value=9.25, sensitivity=60% and specificity=58%. Comparison of all platelet indices with MPV showed AUC=0.664, P=0.022, cut-off value=9.25, sensitivity=60% and specificity=58%. Comparison of all platelet indices with D Dimer can increase detection sensitivity of DVT even in absence of Duplex Scan and can be used as screening method to detect DVT.

The incidence of pulmonary embolism in patients with combined ilio-femoral venous thrombosis and iliac vein stenosis

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**Background:** The purpose of this study is to assess the hypothesis that early thrombus removal in extensive iliofemoral DVT would preserve deep venous function.

**Methods:** Between June 2015 and July 2017, patients with symptomatic extensive ilio-femoral DVT were treated with percutaneous thrombectomy by the AngioJet system. Presence and grading of iliac vein stenosis as well as evidence of previous thrombosis, with scarring of the femoropopliteal segment, was documented at the time of the intervention. Patients were followed-up by clinical examination and limb circumference was used to objectively document reduction in oedema. Serial femoropopliteal duplex ultrasound was used to assess patency of treated vessels and residual incompetence of the femoropopliteal segment. Technical success was defined as restoration of flow in the affected area by 4 weeks post intervention.

**Results:** Technical success was achieved in 98% of patients. Of these, 62% had intraoperative evidence of previous lower limb DVT with scarring evident. On immediate follow-up, all the patients treated reported no recurrence or progression of the DVT and clinical improvement. DVT was documented within 48 hours. Patency of the iliofemoral segment correlated well with the absence of post thrombotic syndrome while ultrasound in the cohort with no signs of previous DVT showed preservation of valvular function in the femoropopliteal segment.

**Conclusions:** In patients presenting with extensive ilio-femoral DVT it is common to find not only iliac vein stenosis but also femoro-popliteal vein stenosis suggestive of previous sub-clinical DTVs. Early thrombus removal appears to be effective at preventing post-thrombotic syndrome and preserving valvular function.

The treatment of upper extremity deep vein thrombosis and its risk factors

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**Background:** Through the upper limbs of deep vein thrombosis in our hospital patients were retrospectively analyzed, analysis the reasons of upper extremity deep vein thrombosis, to explore the clinical performance of upper limb deep vein thrombosis, and the treatment, in order to implement clinical intervention, effectively reduce the PICC related incidence of thrombosis.

**Methods:** We selected 126 cases of patients with upper limbs of deep vein thrombosis occurred in our hospital from May 2014 to June 2015, who met the inclusion criteria were included in the object of study, discussed the reasons of upper extremity deep vein thrombosis, risks and clinical manifestations and the scope of prognosis. Statistical analysis of group comparison of incidence between the x2 test, the related risk factors of single factor and multi-factor logistic regression analyzed. Results there were 117 cases of patients with malignant tumor, 117 cases of patients with history of PICC catheter, 88 patients there is swelling, pain symptoms, 76 cases of patients, 12 patients complicated with lower limbs deep vein thrombosis, pure involving the subclavian vein, axillary vein, internal jugular vein was 12, 11, and 26 cases, involving multiple root vein of 77 cases, including 9 cases of patients with CTA diagnosis of pulmonary embolism, 5 cases died, formal anticoagulant treatment, 114 patients were significantly improved.

**Conclusions:** PICC related of upper extremity deep vein thrombosis incidence is higher, and some patients without obvious clinical manifestations, we need attention. Regular anticoagulation is first choice for the treatment of upper limb deep vein.

Incidence of residual deep incompetence post successful angioplasty thrombectomy of extensive ilio-femoral DVT

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**Background:** The purpose of this study was to assess the hypothesis that early thrombus removal in extensive iliofemoral DVT would preserve deep venous function.
VASCULAR ANOMALIES

Congenital vascular malformations: from diagnostic to treatment

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Background: Congenital vascular malformations (CVM) occur in 1.5-10% of the total population. Various manifestations of CVM cause difficulties in diagnosis and treatment, resulting in disability and sometimes, death of the patient.

Methods: The data of 630 patients with CVM (period 2005-2016) were analysed. Females predominated (55%), average age was 25.5. Ultrasound duplex scanning, selective arteriography, phlebography, multidetected computed tomography, pathomorphological and immunohistochemical studies (proliferation markers VEGF, Ki67), study of the hemostasis (D-dimer, soluble fibrin, fibrinogen) and fibrinolytic system (protein C) were investigated.

Results: The source of proliferation of both forms of CVM (venous and arteriovenous (AV)), given the level of VEGF and Ki67 expression, is precisely the microcirculatory vasculature, due to the existence of existing AV microfistulas. It was discovered significant imbalance of hemostasis system in preoperative period in 9 (43%) patients with AV CVM (significant activation of coagulation capacity with normal activity of fibrinolytic system), in postoperative period hypocoagulation was observed at 4 (57%) of patients.

Treatment strategy:
1. Endovascular methods (embolization with the use of non-spherical PVA particles) during preoperative stage and combination of surgical, embolization, laser and sclerotic methods in perioperative stage;
2. Correction of AV shunting separately or in conjunction with venous hypertension correction;
3. Correction of secondary venous hypertension in superficial and/or deep venous systems.
4. Correction of lymphatic outflow (lymphodrenation, lymphangioplasty, and lipolymphoaspiration, lymphovenous anastomoses).
5. In cases of severe pain syndrome neurolysis with fascicullary dissection were performed.

Conclusions: This pathogenically based approach allowed to obtain satisfactory long-term results in 76% of patients.

Pelvic venous malformations

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Background: Location of venous malformations in the pelvic area may be difficult to recognize and to treat. For this reason, patients are often not treated. Aim of this paper is to do a retrospective analysis of a group of patients affected by pelvic venous malformations that come to our Center for treatment in order to recognize if treatment is possible and which results.

Methods: A group of 624 patient affected of venous malformations, collected and treated by our Center between 2011 and 2015 were analyzed in a retrospective study. 35 patients (6.2%) had a venous pelvic malformation. Location of malformations were: female genitals: 16 (46%), glutei: 8 (23%), male genitals: 2 (6%), intrapelvic: 5 (14%), psoas muscle: 4 (11%). 15 cases (43%) had also VM in other locations.

Examinations performed were: Duplex scan (35); MR (33) CT (2) RX (8). Treatments were: percutaneous alcohol treatment: 51, laser 16, surgery. 1. Patients were evaluated at the end of treatment clinically, by duplex scan and, if deep located defects, by MR. Healed patients were those with a complete occlusion of the abnormal veins, improved patient had a partial occlusion and no or slight symptoms, unchanged cases had no change in dysplastic vessels

Results: 15 cases were defined “healed”; 8 of this were genital VM. 12 cases has a significant improvement with main reduction of symptoms. 1 case remain unchanged. 7 patients were not treated because of slight symptoms or because they refuse treatment. 2 patients had a small skin necrosis on gluteus, which healed without problems. No other complications were noticed

Conclusions: Pelvic venous malformations can be treated with good results. Main techniques used are alcohol sclerosis and laser. These techniques should be well known before performing them.

Surgical tips for hand arteriovenous malformations

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Congenital arteriovenous malformations (AVMs) are a primitive type of congenital vascular malformation that forms as the residual remnants of a developmental arrest in the early stage of embryonic life. AVMs of the hand display various clinical presentations, including heaviness, a pulsating mass, a sensation of heat, pain, bleeding, ulceration and necrosis. Furthermore, hand AVMs are likely to cause cosmetic complications and functional impairment or fracture. A large shunt can create hemodynamic alterations leading to cardiopulmonary overload and congestive heart failure. The lesions may or may not become clinically evident from birth to adulthood. Trauma, surgery and hormonal influences may cause the lesion to expand hemodynamically.

Hand AVMs are unusual and when they are present, they are difficult to treat because of the necessity to maintain function and there is a high complication rate after treatment. The treatments of AVMs of the hand include conservative treatment, embolo/sclerotherapy, partial excision and amputation; however, there is currently no consensus for the treatment of AVMs of the hand.

We will present the surgical tips for hand AVMs during the Congress.

How to manage the soft tissue injury caused by embolo-sclerotherapy

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Despite the advances in vascular medicine, congenital vascular malformations (CVMs) are still a challenge among the many vascular diseases. Complete eradication of the nidus of a CVM has been known to be the therapeutic option for achieving a potential cure. Yet, complete surgical eradication of the nidus of a CVM is rarely possible for most of the infiltrating type of CVMs, except for the small, localized and surgically accessible lesion. Blocking the route for embolo/sclerotherapy by ligation of the feeding arteries and partial excision of the nidus might interfere with embolo/sclerotherapy, and the outcome is then worsened.
Once the accurate diagnosis of the CVM is established, further decisions should be referred to the multidisciplinary team of the CVM. The multidisciplinary team might be made up of special departments related to the management of CVM: vascular surgery, plastic and reconstructive surgery, orthopedic surgery, interventional and diagnostic radiology, physical medicine and rehabilitation etc. Embolo/sclerotherapy may be an effective treatment method because no recurrence has been observed during the relative long-term observation period and the morbidity was acceptable. Yet, it is not well known what type of vascular malformation is more susceptible to complication such as soft tissue injury or neuropathy after performing embolo/sclerotherapy.

We will present how to manage the soft tissue injury caused by embolo/sclerotherapy during the Congress.

Management of complicated venous malformations
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Background: Venous malformations may manifest in different locations and extension. Complicated or complex forms are cases with a diffuse, infiltrating form, cases located in areas with fine structures were a treatment may be difficult or cases with a combination of VM and other type of defect, like lymphatic or A-V malformations. Location of comprex cases are in different parts of the body with different approach problems.

Methods: Some particular complex cases located on head, neck, limbs, hand, abdomen and foot are presented. Problems of diagnostic and of treatment possibilities are discussed

Results: By a complete diagnostic and the correct treatment technique, even these complex cases can be managed. To operate together with other specialists often makes the difference.

Conclusions: Even complex venous malformations can be treated, if correctly approached. Multidisciplinary approach is often required. These cases are not for a single operator.

Vein valve defects and insufficiency in children
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Background: Venous insufficiency of the lower extremities is regarded to be a genetically determined, acquired disease. Children have rarely been examined. In earlier studies, the incidence is commonly estimated to below 1%.

Methods: In an ongoing study, the legs of 36 young relatives of vein patients, aged 6 – 16 (18 m, 22 f) were examined with high frequency ultrasound (X 700, 12-16 MHz; Vevo MD, 16 – 40 MHz).

Results: In 13/36 children (36.1%) venous pathology was found: Valvular defects of the GSV with reflux (N.=4) or without macroscopic reflux (N.=4), reflux of GSV without detectable valve defect (N.=2), valvular lesion of SSV (N.=1), perforator insufficiency without valve detection (N.=2). All cases were unilateral. 6/13 cases with pathology (46.1%) showed changes of regional superficial veins (diameter increase, more intense colour).

Conclusions: The incidence of detected valve lesions in children was above all expectations, even if taking a bias by case selection into account. Supposed that the acquisition of valvular insufficiency by hypertensive wall stress/dilatation or stasis/inflammation takes decades, the shown pathologies should be best explained by congenital valve defects. New strategies for systematic detection, coaching and adequate therapy have now to be developed.

Vascular anomalies in the mesenteric circulation of patients with Crohn’S disease. A pilot study
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Background: Crohn’s Disease (CD) is a chronic inflammatory bowel disease and its pathogenesis is still not well understood. Previous studies suggested the possibility of the involvement of vascular system, but, todate, the mesenteric circulation has poor been investigated, especially in complicated CD cases requiring colectomy.

Methods: We investigated the mesenteric circulation in a case-control pilot study, including 19 controls and 7 patients affected by complicated cases of CD. Cases and controls underwent selective angiography of both superior and inferior mesenteric district.

Results: Transit time was found either significantly shortened in 2/7 cases (29%), or prolonged 5/7 (71%) (P=0.0034 in the superior mesenteric district; P=0.0079 in the inferior mesenteric district), respectively due to the presence of A-V malformations and of a miscellaneous of venous abnormalities, which included thrombosis, hypoplasia and extra-truncular venous malformations.

Conclusions: Our study demonstrates the presence of congenial or acquired vascular anomalies in a small sample of CD patients not responder to current treatment and with severe complications. The present pilot study warrants further investigations.

A study of angiotensin II level and treatment by intralesional bleomycin in hemangiomas
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Background: Hemangiomas are the most common tumors in infancy especially in Head and Neck region. The incidence of Hemangiomas in the first 3 days of life is 1% to 2.5% and increases to 9% to 12.5% between the ages of 1 month and 1 year of life. Our study is aimed at studying the effect of intralesional Bleomycin to assess its response. Also we studied the role of Renin-Angiotensin system in the biology of infantile Hemangiomas demonstrated by the expression of Angiotensin II.

Methods: A detailed proforma was made. For estimation of serum angiotensin II-Angiotensin II Human ELISA kit was used in serum of patient and result was compared from Standard curve.

After confirmation by Doppler study, Intralesional Bleomycin Sclerotherapy was carried out so to uniformly distribute it in the lesion area and the response was assessed.

Results: Fifty patients with peripheral hemangiomas were studied. Nearly all patients of Hemangiomas who underwent sclerotherapy responded to current treatment and with severe complications. The present pilot study warrants further investigations.
Characteristics and clinical presentation of venous malformation of extremities

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Background: The presentation of venous malformations (VM) is variable but it has not been well documented. This study was designed to determine the clinical characteristics in association with the type and extent of VM.

Methods: Patients with VM diagnosed by physical examination and confirmed by ultrasound, CT or MRI were included in the study. Data were collected from three University hospitals from 2009 to 2017. Demographics of the patients, type, extent and tissue involvement of VM, signs and symptoms were reviewed. The severity of the symptoms and the impact on the patients’ quality of life was recorded. Those with arteriovenous malformations, lymphedema and symptoms from other unrelated diseases were excluded.

Results: There were 55 patients with a mean age of 33.6 years (19 males/36 females). Klippel-Trenaunay syndrome was diagnosed in 3 patients. Lower extremities were more frequently involved (N=39, 70.9%) than upper extremities (N=16, 29.1%). Most lesions were localized (N=38, 69.1%). VM extended into the subfascial space in 32 (58.1%). Accompanying signs and symptoms were venous enlargement (N=32, 58.2%), pain (N=39, 70.9%), and swelling of the extremities (N=37, 67.3%). Patients with VM distributed on their leg showed symptoms of venous insufficiency, including aggravating pain while walking (N=32, 82.1%), swelling worsening with prolonged standing (N=27, 69.2%), fatigue or heaviness of lower extremities (N=12, 30.8%), discoloration (N=7, 18.4%) or ulcer (N=2, 5.6%). These symptoms were related to the extent of the lesion (odds ratio=4.84; 95% confidence interval, 2.335-7.346; P<0.001), but not to the involved depth (P>0.05). The treatment method was mainly decided by the extent and the depth of lesions. Excision was performed in 13 (23.6%) patients, sclerotherapy in 15 (27.0%), embolization in 2 (3.6%), endovenous laser ablation in 1 (1.8%) and stripping in 2 (3.6%).

Conclusions: VM of the extremities affected patients’ quality of life significantly by their appearance and pain. There was significance association with the VM extent and symptoms severity. Significant satisfaction was achieved when treated localized malformation where in the extensive ones symptoms intensity was reduced.

Sclerotherapy and venous malformations: a South Australian perspective over the decade

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Background: Vascular malformations are a vast group of congenital malformations that can cause significant symptoms to children. Although a range of treatment options exist, they can be particularly challenging to treat effectively. Sclerotherapy has become an important tool in the treatment of vascular malformations, however, little is known about the overall success and patient satisfaction.

Methods: This study retrospectively evaluates the clinical outcomes of percutaneous sclerotherapy for venous malformations at the Women and Children’s Hospital and Australian Craniofacial Unit over from 2007 – 2017. A multidisciplinary team approach driven by protocol was implemented during the assessment in conjunction with radiologists to formulate a plan of assessment and treatment.

Results: The clinical and radiological data from medical records were analyzed to obtain information about venous malformations. The data evaluated the results of sclerotherapy, types and rates of complications, outcome relations with age, size and number of sessions.

Conclusions: The review highlights that sclerotherapy is a safe method for local malformations, but there are moderate risks that need to be taken into consideration for all cases to delineate which patients will gain most benefit. A multidisciplinary approach from the unit provides a holistic assessment of the patient and long term follow-up over the years as they grow.

Development of knowledge on vascular anomalies through history. Main contributors in the last decades

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Background: Complexity and variability in CVM made it difficult to understand CVM. Beside popular belief, like the “maternal impression” (influence of maternal emotions during pregnancy) and others, in the past centuries, descriptions of different clinical cases with difficulty to understand the disease, due to a lack of diagnostic instruments, were common. Interest were mainly focused on clinical cases that probably were CVM malformations. Well know is the description of an AVM of the scalp by the Florentine doctor Guido Guidi in the XVI century. Between others, the French dermatologist Jean Louis Alibert described different types of vascular anomalies trying to classify them. Rudolph Virchow proposed a classification that was a main progress in knowledge and in the process of clarity around CVM. The well know paper of Klippel and Trenaunay in 1900 and the papers of Frederick Parkes Weber (1907 – 1918) were considered a milestone in the development of knowledge, even if later these papers create also confusion. De Takats in 1934 proposed a distinction between AVM and other anomalies. A main contribution was those of Mulliken and Young in 1988 who made clear the difference between hemangiomas and vascular malformations.

Methods: Treatment of AVM was discouraged after the paper of Szlagyi in 1976. However, the publications of Malan (1974) and that of Belov (1986), based on personal experience on large series, demonstrated the feasibility of surgical approach, even if failures were possible. Improvement in endovascular techniques and the introduction of alcohol embolization by Yakes in 1986 marked another main progress in treatment.

Results: Recent discover of the efficacy of Propanolol in the treatment of hemangiomas by Léauté-Labrézé (2008) changed significantly the approach to that common anomaly

Conclusions: Knowledge about vascular anomalies is on the way.

Vascular anomalies, modified hamburg classification: truncal diseases

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Background: Hamburg Classification has been proposed by Stefan Belov in 1988, during the Vascular Malformation Workshop on Hamburg 1988. It is based on the classification of Malan (1965), which has been the most accepted classification at that time, with some main modifications. His main advantage is simplicity, as it include all defects in few groups in a period in which very complicated classifications were proposed. The group of truncal (or truncular) defects includes all anomalies of main vessels: arteries, veins and lymphatics. The defects are divided in hypoplasia, aplasia and dilatation. This simplicity is very effective for diagnosis, as it is a good guide for progression of examination.

Conclusions: In this lecture, different types of truncal vascular artery, venous and lymphatic in different parts of the body were presented and discussed. Clinical pictures related to the single defect were shown.
POST-THROMBOSTIC SYNDROME

Clinical efficacy of electrical calf muscle stimulation in patients with residual venous obstruction and post-thrombotic syndrome

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Background: To assess the efficacy of electrical calf muscle stimulation (EMS) in patients with post-thrombotic syndrome (PTS) and residual venous obstruction (RVO).

Methods: This was a prospective, comparative, non-randomized clinical trial involving patient after the first episode of unprovoked popliteo-femoral DVT who had completed a standard 6-month course of anti-coagulation therapy and had signs of RVO in the affected veins and a Villalta score of >5.

A total of 60 patients in the age range from 40 to 86 years (mean 58±11.4) consisting of 38 men and 22 women were enrolled. They were divided into two groups of 30 participants each. In both groups (treatment and control), PTS was treated by active walking, below-knee graduated compression stockings, and micronized purified flavonoid fraction. In the treatment group, EMS with a Veinoplus V10 device (three procedures for 30 min every day) was also used. The criteria for treatment efficacy included changes in Villalta, VCSS and CIVIQ-20 scores, assessed at baseline and every 6 months of treatment. The patients were followed for 12 months with monthly DUS in order to reveal recurrent DVT.

Results: Recurrence of venous thrombosis was found in seven of 30 patients in the control group and in zero of 30 patients in the treatment group (P=0.011). All these cases were excluded from subsequent analysis. Patients of the treatment group had a significant tendency to decrease the VCSS score: 9.9±1.6 – 7.8±1.6 – 6.1±1.5 (P=0.0001); Villalta score: 18.9±3.9 – 12.8±4.0 – 8.3±2.7 (P<0.0001); CIVIQ-20 score: 67.8±8.4 – 51.3±8.4 – 40.0±10.5 (P<0.001). In the control group, a similar trend was observed for the VCSS score: 8.1±2.8 – 7.3±2.1 – 7.2±2.1 (P=0.014); for Villalta score: 12.7±6.7 – 10.9±5.6 – 10.2±5.4 (P=0.002), but not for the CIVIQ-20 score: 48.2±19.3 – 46.7±17.5 – 47.4±16.2 (P=0.05). At the background of EMS, changes in the current parameters were more intensive (P<0.05).

Conclusions: using EMS technology in the complex treatment of PTS allows reducing clinical severity of disease and increasing the quality of life in patients with RVO.

Endovascular treatment of PTS

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Background: To determine the effects of Endovascular treatment of postthrombotic syndrome (PTS).

Methods: The clinical data of 32 patients with PTS and treated with endovascular therapy were retrospectively analyzed. The age of these patients ranges 34–72 (mean 58±12), History of DVT was 3-24 months. Villalta’s scores were all ≥15. These patients were divided into 3 groups.

Results: The endovascular treatments were successful in these patients. All the iliac lesions were treated with stenting while the femoral/superficial femoral lesions were treated with balloon angioplasty. The postoperative recoveries were uneventful. Warfarin was taken postoperatively as long-term anticoagulant. Elastic stockings and auxiliary medicine were used for quick recovery. Follow-up time was 3-28 months, all the patients had their symptoms and signs relieved or cured including 2 patients in group II with intractable ulcers healed.

Conclusions: Endovascular treatment for PTS was safe and effective with quick and smooth recovery. Balloon angioplasty is also valuable for severe venous lesions in the limb.

Correlation of clinical and ultrasound parameters used to assess the severity of post-thrombotic syndrome in patients after popliteo-femoral DVT

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Background: to evaluate the correlation between VCSS, Villalta, VSDS, CIVIQ-20 and the modified Marder scores in patients with post-thrombotic syndrome (PTS) and signs of residual venous obstruction (RVO) of the popliteo-femoral veins.

Methods: It is correlation analysis of the data generated from a clinical trial aimed to assess the effectiveness of electrical calf muscle stimulation in the complex treatment of PTS in the presence of RVO. The study enrolled patients after the first episode of clinically unprovoked proximal DVT who had completed the standard course of anticoagulation and presented a clinical picture of PTS (5 or more Villalta scores) and signs of RVO of the popliteo-femoral venous segment with a residual stenosis of 20% or more. All patients were examined clinically and by duplex ultrasound at the time of enrollment, and after 6 and 12 months of therapy. The evaluation was performed by the Villalta, VCSS, VSDS scores, CIVIQ-20 questionnaire, and the modified form of Marder VJ.

Results: A total of 60 patients were included into the study, of which recurrent DVT was observed in 7 cases. So, 55 patients entered the analysis at the 6th month and 53 patients at the 12th month, as well as data of 53 patients, were used for the analysis of dynamic changes. During the 12-month follow-up, there was a direct, significant correlation of moderate to high strength between scores of VCSS, Villalta, and CIVIQ-20. The correlation between the severity of hemodynamic changes (VSDS and Marder scores) and the clinical severity of PTS (VCSS, Villalta and CIVIQ-20 scores) was variable and characterized by low and moderate strength. The dynamic changes in the mean values of VCSS, Villalta, CIVIQ-20 and Marder scores were characterized by a strong and significant correlation. Dynamic changes in the mean values of VSDS score did not correlate with other parameters.

Conclusions: The investigated parameters show a good correlation with each other at the moment and in the time period. They all should be used for complete assessment of clinical severity and hemodynamic disturbance in PTS.
Postthrombotic syndrome is reduced by lipid lowering therapy

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Methods: Between 01/2002 and 03/2017 30,186 patients were treated for venous disease in our institution, 551 (1.8%) with DVT. The Villalta scoring system was used for the assessment of the severity of PTS. 421/551 (76%) patients developed PTS. 61/551 (11%) received lipid lowering therapy. All patients were treated conservatively with compression stockings and all patients received therapeutic anticoagulation, except 2 patients, who refused therapy. Patients received clinical exam with duplex sonography after 2 weeks, 3 months, 6 months and annually thereafter. 192/551 (35%) had recurrent DVT and received life-long therapeutic anticoagulation.

Results: 381/487 (78%) patients without LLT presented with PTS and 40/61 (65%) patients with LLT (P=0.027). Severe PTS (Villalta score mean 16.8) appeared in 12/381 (3%) non-LLT patients but not in LLT group. In our study, the risk of recurrent DVT was not lowered by LLT.

Conclusions: Postthrombotic syndrome is reduced by lipid lowering therapy.

Compression in Patients with Cardiac Failure

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Guidelines often recommend that compression is contraindicated in acute/uncontrolled heart failure. In elderly patients with chronic oedema, heart failure may be the sole cause or a contributory factor in the development of swelling. In patients with leg ulcers, the coexistence of heart failure also needs to be considered in the decision to use compression. The clinical history and examination may indicate the presence of heart failure but further investigations such as plasma B-type Natriuretic Peptide (BNP) and echocardiography are helpful in determining the degree and type of heart failure.

The safety of the use of compression may be different in heart failure with reduced ejection fraction and that with preserved ejection fraction. In patients where heart failure is the major cause of oedema, appropriate management of the heart failure e.g. with drugs should be the first step. If residual chronic oedema remains a problem despite optimum drug management of the heart failure, then, particularly in those with leg ulcers or lymphorrhoea, compression may need to be considered. In these circumstances modified (reduced) compression is often recommended with advice to discontinue the compression should breathlessness develop.

The use of serial BNP measurements may help in decision-making. A case series of these will be described.

Combined use of micrionized purified flavonoid fraction with oral rivaroxaban reduce the incidence of post-thrombotic syndrome at six month after proximal deep vein thrombosis

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Background: to assess the impact of long-term using of micrionized purified flavonoid fraction (MPFF) in the treatment of proximal deep vein thrombosis (DVT).

Methods: this was a pilot randomized open-label study enrolled patients with the first episode of popliteal-femoral DVT confirmed by duplex ultrasound. All participants were randomized into two groups: control, that received a standard treatment with oral rivaroxaban and graduated compression stockings (20-40 mm Hg), and experimental, that required additional treatment with MPFF 1000 mg per day. Both drugs and stockings were used for 6 months. Patients were followed-up for the whole period of treatment. At the end of follow-up, patients were assessed with Villalta score and VCSS score. Post-thrombotic syndrome (PTS) was diagnosed in those, who had 5 and more Villalta scores.

Results: 40 patients were randomized into the control (N=18) and experimental (N=22) groups: 27 men and 13 women, mean age of 57,1±14,3 years. The median of Villalta score in the group treated additionally with MPFF was significantly lower compared to the control one: 2,0 versus 6,0 (P=0,001). The same difference was found for VCSS score: 2,0 versus 6,0 (P<0,001). According to Villalta score, PTS was diagnosed in 6 of 22 patients in the experimental group and in 13 of 18 patients in the control one (P=0,01). None of any patient had a severe PTS.

Conclusions: MPFF using can reduce the incidence of PTS diagnosed at 6 months in patients with proximal DVT treated with oral rivaroxaban.
**Methods:** Reviewed.

Its relationship to non-thrombotic CVD has not been comprehensively studied. Thrombophilia as a risk factor, particularly with respect to post-thrombotic CVD.

**Background:** Chronic venous disease (CVD) represents a significant healthcare burden, presenting with a spectrum of clinical signs including venous ulceration and venous ulceration. Studies have proposed thrombophilia as a risk factor, particularly with respect to post-thrombotic CVD. Its relationship to non-thrombotic CVD has not been comprehensively reviewed.

**Methods:** PubMed and EMBASE databases were systematically searched from 1946 until March 2017. Case-control studies, cohort studies or randomized clinical trials reporting on the relationship of thrombophilia to non-thrombotic lower limb CVD in adult patients were included. Non-English and post-thrombotic syndrome studies were excluded. Study selection and data extraction were performed by two independent reviewers.

**Results:** 15 studies met the eligibility criteria, reporting on 916 cases and 1,261 controls. Studies largely focused on venous ulceration and investigated multiple haemostatic factors. A direct relationship between thrombophilia and non-thrombotic CVD was identified, with greater prevalence and factor concentration alteration reported in patients compared to controls. Presence of multiple concomitant thrombophilia was also associated with earlier CVD onset. Targeting hyperhomocysteinemia with folic acid and factor VIII, PAI-1 and von Willebrand factor with aspirin shows promise in enhancing CVD treatment. Relationship strength between each thrombophilia and CVD varied, with commoner aetiologies like factor V Leiden and elevated factor VIII showing clearer correlation than rarer ones such as antithrombin deficiency.

**Conclusions:** Thrombophilia is associated with non-thrombotic CVD but causation cannot be determined. Future research should focus on prospective studies with larger study populations to establish causation and then identify adjunct therapies targeting thrombophilia.

**Our outcomes of ClariVein ablation in one day surgery clinic, Palas Athena**

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**Background:** The authors of the retrospective study present four years outcomes with mechanochemical endovenous ablation (ClariVein). The ClariVein is a new minimally invasive method which combines mechanical damage of endothelial cells and chemical injury with liquid sclerosant. The advantages of these methods are reducing pain during and after treatment, as well as reducing heat-related injury.

**Methods:** We present retrospective study in the period from January 2013 to January 2017. The inclusion criteria was reflux in great, small or accessory saphenous veins and patients who had vein diameters of 3 mm to 10 mm. In small part of patients we need to use sedation. Tributary veins were treated by concomitant or subsequent sclerotherapy. Initial technical success, complications, visual analogue scale and closure rate were assessed. Patients underwent duplex sonography 3 day, 3 month and 1 year after procedure.

**Results:** 124 patients underwent 138 ClariVein ablation in One Day Surgery Clinic from 2013 to 2017. We performed 124 procedures in great saphenous vein, 9 procedures in small saphenous vein, 5 procedures in accessory saphenous veins. The occlusion rate was after 3 days 100%, after 3 months 96% and after 1 year 92%. The visual analogue scale was between 1-2 (0-10). No paraesthesia was occurred in our patients. We noted no deep vein thrombosis and no pulmonary embolism.

**Conclusions:** The introduction of ClariVein system brings a tumescent less approach in venous surgery. The damage of venous wall during the procedure is less invasive than in heating methods. The results of ClariVein ablation are very similar to thermal methods, about 90-95% of success rate after one year of follow-up. We confirm, that ClariVein system is the successful and safety procedure.

**Multi-discipline based standard operating procedure to decrease phlebitis in surgery patients**

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**Background:** Phlebitis after operation has been a significant problem in surgery clinical practice, as unavailable IV protocol between surgery
wards and operation rooms (ORs), resulting in phlebitis and additional cost. Methods: A prospective study was performed in surgery patients in March, 2016 - May, 2017. Inclusion: 1. Aging 18-65; 2. IV occupation 12h before surgery; Exclusion: 1. Patients with a central venous catheter; 2. Sent to ICU; Patients with central venous catheter during operation were removed. No IV consensus in March, 2016 - September, 2016 (Traditional group) between wards and ORs. SOP was performed in October, 2016 - May, 2017 (SOP group). Patients followed SOP and conferences were held monthly to report issues. Patients’ age, gender, preoperative score of activities of daily living (ADL), phlebitis, stage of phlebitis were collected. Continuous variables were expressed as x±s. T test was used whereas Chi-square, rank-sum test in categorical variables. Statistical significance was defined at P<0.05 (two-tailed). SPSS 17.0 was used.

Results: 942 patients were enrolled. 237 males, aging 53.67±8.85 and ADL 93.18±1.34 in traditional group, 241 males, aging 52.61±9.37 and ADL 93.22±1.58 in SOP group. No significant differences were found (P>0.05). 28.27% phlebitis, 22.90% stage I, 3.70% II, and 1.67% III phlebitis in traditional group, 11.69% phlebitis, 8.35% I, 2.30% II and 1.04% III phlebitis in SOP group. There was a significant difference in phlebitis and stage I phlebitis rate (P<0.01).

Conclusions: SOP significantly decreased phlebitis especially stage I phlebitis, contributing to IV management in surgery patients.

Endovenous thermal ablation and hypnosis
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Background: When performing endovenous thermal ablation of great saphenous veins, the average pain was 4.6±1.8 (ranging from 0 to 10) in a previous study (only local tumescent anesthesia had been proposed as recommended in Europe). We reassessed this pain in a series of patients for whom hypnosis was proposed in addition to tumescent anesthesia.

Methods: Non-consecutive monocentric observational study. The patient had to be voluntary. The usual protocol was applied for the endovenous thermal treatment. We asked the patient to evaluate his pain at the end of the procedure. All patients were treated with endovenous thermal ablation of the great saphenous vein. A hypnotic induction was performed at the operating room followed by maintenance of the hypnotic state during all the procedure. A preparative visit was carried out to explain to the patient the technique used ( Ericksonian hypnosis).

Results: 10 patients were included. The 10 patients did not report any pain (0/10). When the endovenous thermal ablation was completed, the patient came out of his hypnotic state. Patients all reported to have had sensations which they described as discomfort, but not pain. Hypnotic trans has often been considered comfortable.

Conclusions: This study on a small number of patients who were all adherent, shows that hypnosis can be a considerable contribution in our therapeutic field and this fabulous tool should be better taught to the whole medical community which often doubts its effectiveness.

Long term patient satisfaction from primary and re-do varicose vein surgery based on a one year audit with long term follow-up
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Background: With the aim to assess the quality of varicose vein treatments at our unit a one year audit was undertaken with a long term follow-up. This report deals with the case-mix and early results as well as patients’ opinions regarding the long term result.

Methods: The audit was undertaken at our vascular surgery unit where all operations were registered between Sept, 2009 and August 2010. Last follow-up was attempted after a minimum of five years. Duplex assessment were repeated as were quality of life assessments (AVVO) and assessments of disease severity (VCSS). At the long term follow-up the patients’ opinions regarding symptom relief, cosmetic result and overall satisfaction were registered.

Results: Of 252 operated legs of 236 patients 69 were C2, 104 C3, 54 C4, 14 C5 and 11 C6. Median age was 55 years (16-87) and 70% were females. All patients were symptomatic with pain and swelling reported by more than 80%. Among those who had primary surgery Great saphenous vein (GSV) dominated (82%). The median GSV diameter was 9.5 mm. The great majority (91%) were day surgery cases. Re-do patients had higher VCSS (8 vs. 6) and AVVO scores (27 vs. 16) P<0.0001. Complications were few and mild only one calf vein DVT and 2% wound
infections. Only five treatments were endovenous. After 69 months in median patients having had primary surgery 91% reported symptom improvement, 87% reported excellent/ fairly good/good cosmetic result and 84% were satisfied with the overall outcome. The corresponding figures for re-do surgery were 82%, 58% and 56% respectively.

Conclusions: Good long term results can be achieved following open surgery for varicose veins. The problem is how to deal with recurrence that results in poorer patient satisfaction long term.

Morphological characteristics and endovascular treatment of primary infrarenal aortic dissections

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Background: The endovascular aortic repair (EVAR) strategy of primary infrarenal aortic dissections (PIRADs) remained unclear. We proposed a morphological categorization (types I and II) based on the entry tears and the EVAR strategy of treating type I PIRADs with tubular stent grafts (SGs) and type II PIRADs with bifurcated SGs. The safety, effectiveness and durability of this strategy was evaluated.

Methods: A retrospective study was conducted with 38 consecutive PIRAD patients between Jan 2010 and May 2016 in our vascular center. Endpoints were survival, SG-related complications and infrarenal aortic remodeling.

Results: The study recruited 13 type I PIRADs and 25 type II PIRADs. They were morphologically different. Type I PIRADs usually had larger true lumens and relatively smaller false lumens, while type II PIRADs had more entry tears and longer dissections. All patients underwent EVAR, with 19 tubular and 22 bifurcated SGs. The technical success rate was 94.8% (36 of 38), and the clinical success rate was 97.4% (37 of 38). During follow-up of 36 patients for an average of 28.8 months, all of them survived. No endoleak was observed, but left iliac extension occurred in 2 type II PIRADs. The CTA imaging demonstrated a good infrarenal aortic remodeling with completely thrombosed false lumens, and significant increase in the true lumen size and significant decrease in the false lumen size (P<0.05).

Conclusions: The EVAR strategy based on the morphological categorization was safe, effective and durable with favorable clinical and follow-up outcomes.

Clinical result of surgery for retroperitoneal leiomyosarcoma with involvement of inferior vena cava

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Background: Leiomyosarcomas of the inferior vena cava (IVC) represent a rare form of soft-tissue sarcomas. There are limited data regarding surgical management of IVC and long-term survival. The aim was to review our institutional series of IVC resections and reconstruction for retroperitoneal leiomyosarcoma focusing on the type of vascular replacement, morbidity, mortality and long-term outcome.

Methods: From January 2005 to January 2015, 96 patients with retroperitoneal leiomyosarcoma involving IVC who underwent surgery were collected. Clinicopathological data, surgical, perioperative outcomes and survival outcomes were obtained.

Results: The median age of patients was 47 years (range 16 to 70 years). The distribution of tumors along the IVC was as follows: upper segment (N=12), middle segment (N=57), and lower segment (N=21). The percentage of high, intermediate and low grade leiomyosarcoma was 19%, 28%, 53% separately. IVC was managed in one of four ways: ligation (N=0, 0%), primary repair (N=58, 60%), interposition expanded polytetrafluoroethylene tube grafting (N=33, 34%), or patch repair (N=5, 6%). Median follow-up was 24 months, the 3- and 5-year overall survival for all these patients were 73.5% and 39.2% respectively. The margins and tumor grade has a significant effect on patient’s survival (P<0.01).

Conclusions: Resection of retroperitoneal leiomyosarcoma combined with reconstruction of IVC can be performed with very low morbidity and mortality even when extensive repairs are necessary. Routinely replacement of the IVC with prosthetic graft can avoid extremity venous complications and likely contributes to quality of survival. Survival depends on tumor grade and completeness of resection, experience expertise will improve the survival of patients.

The saw-knife phlebectomy, technique and results

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Background: This instrument was introduced into our practice 30 years ago.

Methods: It consists of three parts: the blade is 3 cm long with saw teeth on one side, the handle, and a narrow shaft (10 cm). Through a stab wound the blade is driven into or near the vein. The knife is twisted round and the vein is gradually reeled up on it. Altogether 4000 limbs were operated on with primary and post-thrombotic varicosity and vascular malformations during classic and laser surgery.

Results: In primary varicosities side branches are completely removed. After inflammation, sclerotherapy, surgery or beneath a crural ulcer only partial removal or destruction could be performed. This is a rather fast technique: all tributaries and perforator veins were treated within 10 minutes. There were excellent cosmetic results mainly because only 1 - 4 stab wounds are necessary to pull out all varicose tributaries of the limb. Crural ulcer results were surprisingly good: there was no recurrence of the 27 followed (15 years) ulcers even if varicosity had recurred. Postoperative morbidity was minimal, usually small effusions (78%), haematomas (22%) and disesthesias (7%) were present. In every case these suffusions disappeared within 6 weeks, haematomas and disesthesias within 6 months. Small reticular and spider veins are not suitable subjects for saw-knife phlebectomy.

Conclusions: Saw-knife phlebectomy of varicose and incompetent perforator veins is fast and easy to perform, and has very encouraging aesthetic results even with serious CVI. We prefer to use it in large varicosity and crural ulcer cases.

Surgical procedure for incompetent perforators

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Background: There are various treatment options for the approach of the reflux at the insufficient perforating veins level: endovenous treatment, SEPS, CHIVA, surgery. Some complex morphologic aspects of the perforators can generate treatment difficulties such as: underfascial multiple branches and single trunk above the fascia; subfascial single trunk and multiple branches above the fascia; inter-perforators anastomosis.
Methods: VANST (Varices’ Ambulatory Non-stripping Surgical Therapy) is a modern minimally invasive ambulatory surgical method of taking the varicose veins out of the circuit by disconnecting the ways of their filling-up (both the venous flux and reflux are eliminated). Through this procedure the varicose veins are left in place but they become just empty collapsed non-functional tubes. By using this technique the insufficient perforators (including their branches and anastomosis) are also closed up and the reflux at their level is eliminated.

Results: The total number of cases operated on using VANST: 2008 (in private practice-office based).

The closing-up and disappearance of the varicose veins occurs immediately in 100% of the cases. All the insufficient perforators are also closed up and the reflux at their level is eliminated. A 5-year follow-up of 1279 cases (63.7%) showed that the recurrence of the varicose veins after VANST occurred in 89 cases (6.95%).

Conclusions: VANST is both a radical and a conservative method: the varicose veins are permanently taken out of the circuit but normal veins are preserved. VANST can be used for closing up insufficient perforators (including underfascial branches, non-saphenous perforators and the inter-perforant anastomosis).
CEREBRAL AND EXTRACRANIAL VENOUS DISEASE

Spinal multiple sclerosis: latent venous issues
Franz Schelling1
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Background: From their first illustration in 1866, the unmistakable instances of multiple sclerosis (MS) of the brain have been represented by evidently or implicitly vein-centred, ventricle-based lesions. Lesion relationships to periventricular veins were yet pointed out only in 1911. The celebrated MS archetypes, however, were marked by scarring wedge-shaped spinal cord lesions, which were described in 1878 by Oppenheimer. The respective lesions were initially described in the denticulate ligaments in 1978. An attribution to excessive intraspinal volume shifts, effected by vehement venous flow reversals into varying venous compartments of the craniovertebral space surfaced in 1986. How far spinal cord and nerve roots are suffering from downwards directed subarachnoid volume shifts due to intracranial/cervical epidural venous expansions or, instead, from upwards directed displacements on the part of abruptly distending lumbosacral/thoracic epidural veins is unknown.

Methods: No spinal MS postmortems respectively in vivo MRIs showing the cord with sufficient spatial resolution becoming accessible, the literature was reviewed for adequate pieces of evidence. Blunt lesion heads were assumed to show where the spinal cord tended to be vigorously displaced to, pointed lesion tails to point to the source of the volume shifts.

Results: Only a few fragmentary pieces of postmortem evidence gave vague hints pointing to exaggerated head-wards or sacrum-wards directed cord displacements.

Conclusions: In multiple sclerosis, the fluid and hemodynamic events underlying the injuring of the spinal cord via its ligaments are still waiting for their systematic exploration.

Efficacy and safety of extracranial balloon vein angioplasty in multiple sclerosis: a double blind sham controlled randomized clinical trial
Paolo Zamboni
Brave Dreams Research Group, Translational Surgery and Vascular Diseases Center, University Hospital, Italy

Background: Chronic cerebrospinal venous insufficiency (CCSVI) is characterized by restricted venous outflow from the brain and spinal cord. Whether this condition is associated with MS, and whether percutaneous transluminal venous angioplasty (PTA) is beneficial in persons with CCSVI and MS, are controversial.

Methods: We investigated this issue in 177 patients with RRMS, 62 were ineligible including 47 (26.5%) who were CCSVI-negative at echo-colourDoppler screening. They underwent a randomized, double-blind, sham controlled, parallel groups trial in 6 Italian centers. Patients were randomly allocated (2:1) to either PTA or catheter venography (sham). Two primary endpoints were assessed at 12 months: (a) a composite functional measure (walking control, balance, manual dexterity, postvoid residual urine volume, and visual acuity) and (b) new combined brain lesions on MRI, including proportion of lesion-free patients. Combined lesions comprised T1-gadolinium-enhancing lesions plus new/enlarged T2 lesions. The analysis was intention-to-treat.

Results: We planned to enrol 423 RRMS patients but only 115 were recruited in the study time frame; 76 were allocated to PTA (31 male, 45 female; age 40.0±10.3), 39 to sham (10 male, 29 female; age 37.5±10.6); 112 (97.4%) completed follow-up. No serious adverse events occurred. Results on efficacy are still under embargo from a major journal and cannot be displayed in this phase.

Conclusions: Brave Dreams is the first multicenter randomized controlled trial to determine the efficacy and safety of venous PTA in MS patients with CCSVI.

A prolonged antibiotic protocol to treat persistent chlamydia pneumoniae infection improves the extracranial venous circulation in multiple sclerosis
Paul Thibault
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Background: Stenoses and obstructions in the extracranial venous circulation have been observed in MS. One mechanism that has been proposed for the association is that the venous obstructions found in MS are due to a chronic persistent venulitis caused by the intra-cellular bacterial parasite, Chlamydia pneumoniae. The objective of this study is to determine the effect of a combined antibiotic protocol (CAP) on venous obstruction seen in MS as measured by a quantitative duplex ultrasound examination (QECDU).

Methods: A non-randomized before-after cohort study was conducted to investigate differences in blood flow volumes pre and 6-months post antibiotic treatment for Cpn infection. Flow volume data was measured by QECDU across affected and unaffected sides from multiple veins segments, IJV J2, IJV J3 and vertebral vein (VV) and global arterial blood flow (GABF) was also measured.

Results: 91 patients were studied. 64 (70%) were found to have positive Cpn serology. There was a significant post-treatment difference (increase in flow) seen for the affected side of Cpn infected patients (mean difference = 56.4mls/min, P<0.022). There was a non-significant increase seen for the affected side of uninfected patients (mean difference=22.9 mls/min, P=0.215). The mean flow rate showed a commensurate decrease in the unaffected side for both infected and uninfected patients.

There was a statistically significant post-treatment increase in GABF for the infected patients (mean difference=89.9ml/min, P<0.019) and in non-infected patients (mean difference=75.8mls, P<0.009).

Conclusions: A CAP improves the extra-cranial circulation in patients diagnosed with MS as measured by QECDU. This effect is statistically significant in patients with positive Cpn serology, with patients with negative Cpn serology showing less benefit.

Diagnostic and endovascular treatment of venous stenosis and chronic cerebrospinal venous insufficiency
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Background: Venous pathology referring venous stenosis is common and causes serious complications including chronic venous insufficiency, venous thrombosis, pulmonary embolism and cerebral neurovascular diseases. The aim of this study is to diagnose and provide endovascular treatment of Chronic cerebrospinal venous insufficiency/CCSVI and venous stenosis with different localizations.

Methods: We diagnosed 182 patients with venous stenosis in different localizations including iliac vein stenosis compression/ May-Thurner syndrome-. 26 patients, stenosis and hypoplasia of inferior and superior vena cava-25 patients, chronic cerebrospinal venous insufficiency/CCSVI-
VI. 123 patients, subclavian vein stenosis- 7 patients, cerebral transversal sinus hypoplasia- 1 patient. Venous stenoses were established using EchoDoppler, CT phlebography and conventional phlebography. In all patients endovascular therapy was performed including balloon angioplasty or stenting.

**Results:** The diagnosis of venous stenosis was confirmed with conventional angiography and phlebography. Balloon dilatation was performed in all cases of proven CCSVI. Stenosis of cava vein and iliac veins were treated with balloon dilatation and stent implantation. Venous blood flow was restored in all patients and clinical improvement was established.

**Conclusions:** Venous stenosis are common and can cause serious complications including chronic venous insufficiency and deep vein thrombosis/DVT/ which requires preventive endovascular treatment. Venous recanalization improves venous drainage and prevents from development of recurrent DVT and chronic venous insufficiency.

The structure of the intracranial veins and elastic-viscous properties of erythrocyte membranes in children with connective tissue dysplasia


**Neurology, the Ulyanovsk State University, Ulyanovsk, Russian Federation**

**Background:** High prevalence of valve absence was found in the internal jugular veins of children with connective tissue dysplasia.

**Methods:** The main group(1) - 30 children with signs of CTD in age from 10 to 16 years. The comparison group(2) - 20 healthy children. Magnetic resonance angiography was performed on the apparatus with a field strength of 1.5 Tesla. In order to examine the state of the cytoplasmic membrane of erythrocytes were manufactured dry preparations of erythrocytes. Preparations was scanned by atomic-force microscope. Quantification of the elastic membrane was performed by calculating the Young’s Modulus.

**Results:** In group 1 hypoplasia of the right transverse sinus occurred in 5% of cases, arteriovenous malformations - 5%, hypoplasia of the left transverse sinus - 10.5%, hypoplasia of the left sigmoid sinus - 5%, hypoplasia of the left internal jugular vein - 10.5%. In group 2 development of intracranial venous anomalies haven’t been identified. Patients of group 1 had a Young’s modulus equal to 182,68 MPa, in group 2 - 111,48 MPa.

**Conclusions:** For children with severe CTD characterized by the presence of intracranial venous malformations, higher Young’s modulus of the membranes of red blood cells, indicating a reduced ability of red blood cells to deform when passing through the microvasculature.

High resolution M-mode characterization of jugular veins valves in patients with neurological and neurosensory disorders

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**Background:** High prevalence of valve absence was found in the internal jugular vein (IJV) of healthy volunteers by means of M-mode high resolution echo colour Doppler (ECD). However, the prevalence of valve in neurovascular disorders linked to chronic cerebrospinal venous insufficiency is still unknown.

**Methods:** A cohort of 83 healthy controls (HC) (35M - 48F, 25±6.7 y.o.), 71 multiple sclerosis (MS) (35M-46F, 40±10 y.o.), 99 Inner Ear Disorders (IED) (43M - 56F 59±12 y.o) underwent ECD investigation of the neck veins, including M-mode evaluation of the IJVs junction valve plane, in standardized postural and respiratory conditions. The outcomes were: valve presence, morphology and motility, the rate of haemodynamic alteration linked to the valve characterization. Institutional Review Board approval was obtained.

**Results:** Bilateral valve presence was found in 38% of HC, 58% of MS and 25% of IED, whereas, bilateral valve absence was recorded in 16% of HC, 10% of MS and 26% of IED (P<0.004). Bicuspid morphology was the more prevalent presentation in HC 56%, while monocusp was more frequent in patients: 75% MS and 57% IED (P<0.0001). The main finding was the presence of mobile valve leaflets found in 98% of HC, conversely fixed valve leaflets were recorded 82% MS [OR (95%CI) 226 (51-999), P<0.0001] and in 41% of IED [OR(95%CI) 34 (8-148), P<0.0001]. Finally, not mobile valve leaflets were found significantly associated to bi-directional and/or absent flow.

**Conclusions:** In patients a significant higher rate of valve presence, functionally not mobile was found. The latter is strongly associated to brain outflow abnormalities.

The collateral venous pathways of brain and spine: safely compensatory?

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**Background:** Principal and collateral channels of the brain and spine’s venous drainage are notorious for their variations and their behaving in unpredictable ways. How far the collateral venous channels are capable to compensate for deficiencies of the principal ones is generally evaluated simply in observing the sequelae of venous obstructions.

**Methods:** To determine the collateral venous channels’ potential compensatory function, the flow conductivity of the main and collateral channels of the cerebral venous drainage has been compared. This at critical and neither compressible nor expandable passages of their paths. Anatomical observations made in 210 human skulls, each with known cranial volume, complemented by data from the literature were used for clarifying this point.

**Results:** The different venous outlets of the human skull relate in contradictory ways. This conflicts with the widespread assumption the venous collaterals were the wider, the narrower the main venous passages are. This conflicts with the widespread assumption the venous collaterals were the wider, the narrower the main venous passages are. How far the collateral venous channels are capable to compensate hindrances to the ordinary venous outflow varies extraordinarily. The requirement to estimate their functional reserve calls for decided efforts to evaluate the subject in using the tools of computational hemodynamics.

Hemodynamics, the key to cause and (interventional) cures in multiple sclerosis

Franz Schelling

Department of Radiology, Regional Hospital, Feldkirch, Austria

**Background:** Veins have been shown to be central to the emergence of cerebral multiple sclerosis lesions. The pertinent in vivo and post-mortem evidence indicates an involvement of circumscribed sectors of primarily larger tributary vessels of the internal cerebral veins. Affected
and non-affected vein parts, as well as tissue compartments, were never found to differ a priori in any respect. The circumscribed changes must accordingly be determined by factors relating to, and by forces acting via the lesion veins, i.e. by hemodynamic circumstances.

Methods: The study grounds in a comprehensive review of the venous and vein-related findings made in multiple sclerosis only. In putting together these changes' specific traits, it is sought to identify the hemodynamic factors which have here been at work.

Results: The given pieces of evidence point to an involvement of retrograde blood displacements respectively of retrograde pressure propagations in the lesion veins. To events, whose biomechanical background still awaits a thorough exploration.

Conclusions: Veins appear capable of actively assailing cerebral structures, sporadically or intermittently, in various changeable ways. Elucidating the underlying biomechanisms should pave the way to interventional cures of specific instances of multiple sclerosis.
DRUGS IN PHLEBOLOGY

Idarucizumab’s cross-reaction with melagatran and other benzamidine-containing compounds

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1Josef Pflug, Loyola & Ealing & Imperial & WLVIC, London, United Kingdom; 2Thrombosis & Hemostasis; 3Thrombosis & Hemostasis; Loyola University Medical Center, Maywood IL, United States; 4Chirurgia Vascolare, Hospital e Maternidade Dr Christovao da Gama, Sao Paulo, Brazil; 5Hematology, Tenon, University Hospital, Paris, France

Background: Idarucizumab is an anti-dabigatran Fab fragment that binds to the benzamidine group on dabigatran and inhibits its anti-thrombin activity. Aim: To determine the relative specificity for benzamidine, as a sole antidote for dabigatran.

Methods: Anti-thrombin agents such as: anti-factor Xa (rivaroxaban, apixaban and DX-9065a) and argatroban, melagatran, hirudin, bivalirudin, human antithrombin, thrombomodulin, heparin cofactor II, and heparin-AT complex were supplemented to citrated plasma at [0.1 to 100 μg/mL]. Idarucizumab was added to each mixture at [1 mg/ml] and anticoagulant activity was assessed using prothrombin time (PT), activated partial thromboplastin time (aPTT), thrombin time (TT), anti-IIa/Xa and thrombin generation assays.

Results: The antibody showed strong specificity for the inhibition of dabigatran and did not affect the anticoagulant and other effects of the other synthetic and natural thrombin and FXa inhibitors with the exception of melagatran. The prolongation of the PT, aPTT and TT by melagatran was completely inhibited by idarucizumab. Idarucizumab inhibited more effectively the prolongation of TT time by dabigatran than the prolongation induced by melagatran. Idarucizumab itself did not produce any effect on whole blood or plasma clotting profile at [<1.0 mg/ml].

Conclusions: A common benzamidine may be the reason of the cross-reactivity of idarucizumab with melagatran. The benzamidine is present in a number of serine protease inhibitors as well as drugs such as pentamidine, propamidine and dibrompropamidine. It is suggested that simultaneous administration of idarucizumab may compromise the pharmacodynamic profile of benzamidine derived drugs such as: antimalarials, anti-psychotic, anti-fungal etc.

Unfractionated heparin, antithrombin and recombinant thrombomodulin: comparative anticoagulant effects and their vascular and hematological implications

Evi Kalodiki1, Zafar Siddiqui2, Parul Aggarwal3, Omer Iqbal4, Debra Hoppensteadt1, Mary Lewis3, Schuarazad Abro5, Kazuhisa Tsuruta6, Jawed Fareed6

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Background: Unfractionated heparin (UFH), antithrombin (AT) and recombinant thrombomodulin (rTM) are all anticoagulant/antithrombotic agents. Currently, a rTM (Recomodulin®) is undergoing clinical trials for vascular and hematologic indications. The aim is to compare their anticoagulant and platelet modulatory effects.

Methods: The effects of UFH, AT and rTM at 0-5 μg/mL were measured on glass activated clotting time (ACT) and thromboelastography (TEG). The prothrombin time (PT), activated partial thromboplastin time (aPTT) and thrombin time (TT) were measured in citrated whole blood and retrieved plasma. The effect of these drugs on agonist induced platelet aggregation (arachidonic acid, adenosine diphosphate, collagen, thrombin and epinephrine) was measured in platelet rich plasma from healthy donors.

Results: The rTM, in contrast to AT/UFH, showed no anticoagulant effects in ACT and TEG at 1.25 μg/mL. At up to [5.0 μg/mL], rTM was a much weaker anticoagulant. In the clotting assays, all agents produced anticoagulant effects in the following order: UFH>AT>rTM. The UFH mildly increased aggregation with some agonists. The AT and rTM did not produce any effects at up to [5 U/ml and 10 μg/ml], respectively, for all of the agonists except thrombin.

Conclusions: The rTM is a much weaker anticoagulant versus UFH and AT, and at therapeutic concentrations, it does not produce measurable anticoagulant effects. The circulating levels of rTM for the management of vascular disorders range from 0.5-1.5 μg/mL. At supratherapeutic concentrations of >2.5 μg/mL, which may occur in patients with renal dysfunction, rTM exhibits weak anticoagulant effects unlikely to cause bleeding.

Combined use of micronized purified flavonoid fraction with oral rivaroxaban increase deep vein recanalization

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Background: to assess the impact of long-term using of micronized purified flavonoid fraction (MPFF) in the treatment of proximal deep vein thrombosis (DVT).

Methods: it was a pilot randomized open-label study enrolled patients with the first episode of popliteal-femoral DVT confirmed by duplex ultrasound (DUS). All participants were randomized into two groups: control, that received a standard treatment with oral rivaroxaban and graduated compression stockings (20-40 mm Hg), and experimental, that required additional treatment with MPFF 1000 mg/day. Both drugs were used for 6 months. Patients were followed-up for the whole period of treatment with series DUS every 2 months to evaluate the degree of recanalization by the compressibility of popliteal (PV), superficial femoral (SFV) and common femoral (CFV) veins. The extension of thrombi was assessed by modified Marder score at the baseline and at 6 months.

Results: 40 patients were randomized into the control (N=18) and experimental (N=22) groups: 27 men and 13 women, mean age of 57.1±14.3. The median of Marder score at baseline was 15.5 in the main group and 9.5 in the control group (P<0.0001). After 6 months of treatment, the Marder score reduced to 0 in the main group and to 2.0 in the control one (P=0.015). The generalization linear model repeated measures found more intensive reducing of Marder score (p=0.0001) and increased speed of recanalization on CFV (P=0.016), SFV (P=0.03) with a non-significant tendency on PV (P=0.189) in the main group compared to the control one. Full recanalization of PV at 6 months was observed in 14 of 22 patients, received MPFF, and only in 4 of 18 persons of the control group (P=0.012).

Conclusions: MPFF using can improve deep veins recanalization in patients with proximal DVT treated with oral rivaroxaban.

Unfractionated heparin, antithrombin and recombinant thrombomodulin: comparative anticoagulant effects and their vascular and hematological implications

Evi Kalodiki1, Zafar Siddiqui2, Parul Aggarwal3, Omer Iqbal4, Debra Hoppensteadt1, Mary Lewis3, Schuarazad Abro5, Kazuhisa Tsuruta6, Jawed Fareed6

1Josef Pflug, Loyola & Ealing & Imperial & WLVIC, London, United Kingdom; 2Thrombosis & Hemostasis, Loyola University Medical Center; 3Thrombosis & Hemostasis, Loyola University Medical Center, Maywood IL, United States

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Conclusions: The rTM is a much weaker anticoagulant versus UFH and AT, and at therapeutic concentrations, it does not produce measurable anticoagulant effects. The circulating levels of rTM for the management of vascular disorders range from 0.5-1.5 μg/mL. At supratherapeutic concentrations of >2.5 μg/mL, which may occur in patients with renal dysfunction, rTM exhibits weak anticoagulant effects unlikely to cause bleeding.
Tinzaparin in intermediate dose for the treatment of superficial vein thrombosis: results from an observational multicenter study - The Seven Study

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1Department of Vascular Surgery, University Hospital of Larissa, Larissa; 2Department of Vascular Surgery, University Hospital of Patras, Greece; 3Department of Vascular Surgery, University Hospital of Alexandroupolis, Alexandroupoli; 4Department of Vascular Surgery, “Kat” Hospital, Athens; 5Department of Vascular Surgery, University Hospital of Heraklion, Heraklion, Crete; 6Department of Vascular Surgery, “Attikon” University Hospital, Athens

Background: Low molecular weight heparins are recommended in the treatment of superficial vein thrombosis (SVT) but with low grade of evidence. This study was conducted to assess the treatment outcomes of acute SVT with intermediate dose of Tinzaparin.

Methods: Retrospective analysis of records from outpatients over a period of 16 months treated in 7 centers with Tinzaparin 0.5 ml (10.000 ant-Xa IU) once daily for a period that was at the treating physician’s discretion. All patients were followed-up of at least 12 weeks.

Results: 296 patients (189 females, mean age 57.4 years) were included. Two third of the patients (191/296, 64.5%) received treatment for approximately 5 weeks (mean 36.9 days) and the remaining (105/296, 35.5%) for a shorter period (mean 16.2 days). There was no difference in patients’ characteristics between the two treatment duration groups. Presence of thrombus above the knee and restricted daily activity were the associated with longer period of treatment. Only one case with minor bleeding was observed. Recurrence of thrombosis over a 12-week follow-up period occurred in 6% (SVT in 14 - 4.7%, DVT in 3 - 1% and thrombus extension in the superficial veins in 1 - 0.3%). Recurrence was not related to the duration of treatment.

Conclusions: Intermediate dose of Tinzaparin was an effective and safe treatment for SVT in the setting of real world practice. Location of thrombus and status of patients’ mobilization were associated with longer duration of treatment. Future prospective randomized studies are needed to corroborate these findings.

The incidence of venous thromboembolism postoperatively in patients undergoing total hip and knee arthroplasty that used aspirin as thromboprophylaxis: a single center, retrospective analysis

Josh Karpes1, Danika King2, Peter Vale1
1St. George Hospital; 2John Hunter Hospital; 3Cardiovascular Medicine, Mater Hospital, Sydney, Australia

Background: Total joint arthroplasty (TJA) poses serious risks for the development of venous thromboembolism (VTE). Pharmacological thromboprophylaxis significantly reduces the incidence of post-operative VTE. Aspirin is often a preferred agent due to ease of administration and economic benefit. The aim is to report efficacy and safety of Aspirin versus non-Aspirin (unfractionated heparin, low molecular weight heparin, warfarin and new oral anticoagulant agents) in VTE thromboprophylaxis following total hip arthroplasty (THA) and total knee arthroplasty (TKA).

Methods: We performed a single center, retrospective analysis included 400 patients undergoing THA and TKA between July 2015 and June 2016, receiving either Aspirin or a non-Aspirin agent as thromboprophylaxis. In-hospital incidence of VTE and bleeding outcomes were compared between the groups.

Results: In-hospital VTE occurred in 13 (6.5%) patients in the non-Aspirin group and 0 patients in the Aspirin group (P=.001). Deep vein thrombosis (DVT) occurred in 11/13 patients in non-Aspirin group and 2/13 had pulmonary embolism (PE). Post-operative venous Doppler ultrasonography was performed more frequently in the non-Aspirin group (48% versus 8%, P<.001). Prior VTE history was also higher in the non-Aspirin group (11% versus 4.5%, P=.015). There was no statistically significant difference in major bleeding between the groups (P=0.58).

Conclusions: Post-operative thromboprophylaxis with Aspirin resulted in a lower in-hospital documented VTE incidence, and no significant difference in bleeding. These results may have been influenced by the lower utilization of venous Doppler ultrasound in the Aspirin group. A randomized prospective trial to compare Aspirin to anticoagulant agents post TJA is needed.

The efficacy of rivaroxaban for endovenous heat-induced thrombosis treatment

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Background: The aim of our study was to investigate the efficacy of rivaroxaban for the endovenous heat-induced thrombosis (EHIT) treatment after endovenous laser ablations (EVLA).

Methods: Prospective noncomparative study includes 1326 patients who had 1514 EVLA over the period from September 2015 to February 2017. In 1091 (72.1%) cases the great saphenous veins (GSV) were ablated. The anterior accessory veins (AASV) were treated in 124 (8.2%) cases and small saphenous veins (SSV) were treated in 299 (19.7%) cases. The EHIT were found out in 21 (1.4%) cases, 19 (1.7%) patients had EHIT of GSV and in 2 (1.6%) cases there were EHIT of AASV. We didn’t observed any EHIT after treatment of SSV. All the patients with EHIT were prescribed rivaroxaban.

Results: According to Kabnick classification it was the 1st class EHIT in 9 (0.6%) cases, the 2nd class in 10 (0.7%) cases and there were only 2 (0.1%) cases of 3rd class EHIT. All the patients were prescribed rivaroxaban 15 mg twice a day. We had to stop of using rivaroxaban for 1 (4.8%) patient because of dyspepsia. In this case we began to use enoxaparin in therapeutic dosage once a day. It was a complete regress of EHIT over approximately 5 weeks (mean 36.9 days). In the remaining 105/296 (35.5%) for a shorter period (mean 16.2 days). There was no difference in patients’ characteristics between the two treatment duration groups. Presence of thrombus above the knee and restricted daily activity were the associated with longer period of treatment. Only one case with minor bleeding was observed. Recurrence of thrombosis over a 12-week follow-up period occurred in 6% (SVT in 14 - 4.7%, DVT in 3 - 1% and thrombus extension in the superficial veins in 1 - 0.3%). Recurrence was not related to the duration of treatment.

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Conclusions: Post-operative thromboprophylaxis with Aspirin resulted in a lower in-hospital documented VTE incidence, and no significant difference in bleeding. These results may have been influenced by the lower utilization of venous Doppler ultrasound in the Aspirin group. A randomized prospective trial to compare Aspirin to anticoagulant agents post TJA is needed.

Sulodexide recovers endothelial function through reconstructing glycocalyx in the balloon-injury rat carotid artery model

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Background: Vascular therapies have mostly focused on repairing endothelium, but little attention has been paid to the reconstruction of glycocalyx, which covers endothelium and protects the function of endothelial cells. Sulodexide has a similar glycosaminoglycan structure to glycocalyx, so it is assumed to be effective in remodeling the damaged glycocalyx and resulting endothelial function.

Methods: We assessed the effort of sulodexide on glycocalyx remodeling in the balloon-injury rat carotid artery model. Electron-microscopy was used to examine the reconstruction of glycocalyx. We evaluated endothelial healing, endothelial function, and inflammatory factors using immunohistochemistry. Blood samples were collected to assess coagulation and lipid metabolism. Animal experimental study have prior ethics approval from institutional authorities.
Results: Electron micrographs showed that sulodexide could reconstruct the endothelial glycocalyx. As for the function of endothelium, sulodexide promoted endothelial nitric oxide synthase level, attenuated endothelial hyperplasia, and inhibited platelet aggregation that benefited from glycocalyx reforming. Sulodexide decreased the glycocalyx damage related expression of CD31 and intercellular cell adhesion molecule-1, accompanying with the downregulation of leukocyte counts and C-reactive protein. The levels of atherosclerosis-related factors increased in activated endothelial cells for the glycocalyx damage, namely osteopontin and vascular cell adhesion molecule-1, were normalized by sulodexide. Combining with the benefit of glycocalyx reconstructing, sulodexide reversed the dyslipidemia. Moreover, sulodexide prevented CD68-positive inflammatory cells infiltration into the vascular wall, presumably as the effect of glycocalyx reconstruction.

Conclusions: Sulodexide reconstructed glycocalyx which preserved endothelial function and attenuated the expression of inflammatory factors, and regulated coagulation and lipid metabolism, all of which are important for vascular healing.

Sulodexide therapy after endovascular or hemodynamic treatment for varicose veins
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Background: Sulodexide, a highly purified glycosaminoglycan, has antithrombotic and anti-inflammatory properties with reported benefits in Chronic Venous Disease (CVD). Varicose veins (VV) are a manifestation of CVD and are characterized by symptoms and signs produced by pathological action of venous hypertension and endothelial inflammation. The surgical removal of VV eliminates the “hemodynamic” problem, but leaves the underlying patient’s vulnerability to CVD pathology unchanged. Therefore the most comprehensive therapeutic approach to VV should include a combined therapy to obtain hemodynamic correction and endothelial protection, by using endovascular surgery and Sulodexide.

Methods: A retrospective analysis has been performed on a large cohort of patients with VV and treated with Sulodexide for 6 months (500 LSU/day) after endovascular or hemodynamic venous treatment checked clinically with a patient questionnaire and in a restricted group of patients with Photoplethysmography (PPG).

Results: The preliminary results show that Sulodexide improves signs and symptoms of legs by reducing heaviness, swelling and inflammation, both after 30 days and 6 months after venous treatment, with a better QOL compared with patients who were treated with only the hemodynamic pattern. To confirm those promising clinical outcomes, a group of 30 patients which were previously studied with PPG test, were controlled with the same modality up to three and six months after the venous procedure obtaining significant results.

Conclusions: Waiting for further confirmations, Sulodexide therapy of VV patients after endovascular or hemodynamic venous treatment, seems to improve the outcome of the procedure in the short and middle term follow-up.

Sulodexide as and adjunctive management in patients with venous leg ulcers
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Background: Sulodexide is a highly purified glycosaminoglycan used on the management of venous disease and known for its antithrombotic properties, as well as for the reparative effect it has on venous endothelial glycocalix. The patients with varicose veins and associated leg ulcers have a proinflammatory state in which glycocalix plays an important role. We studied the effect that sulodexide associated to reflux corrective surgery has on shortening the healing time of varicose vein ulcers.

Methods: We studied 65 patients with varicose veins, great saphenous vein or short saphenous vein reflux and associated leg ulcer that required a reflux corrective procedure. All patients were under the CEAP 6 classification. Duplex scan was performed preop in all patients and reflux of the great or short saphenous veins confirmed. 35 patients were random assigned to receive sulodexide (Vessel Due F; Alfa Wassermann) 250 LRU twice a day one week before surgery and for 8 weeks after surgery. 30 patients were just taken to the procedure with the standard preop and postop care. All patients used postop 18-22 mmHg compression for 8 weeks at least.

Results: Of all the patients we obtained a complete healing of the ulcer in 8 weeks in 88%. While in the sulodexide group we obtained a 91% complete healing at 8 weeks in the surgery alone group we obtained a 83.3% complete healing at the same time. QOL measured by CIVIQ 20 questionnaire was 89 for the sulodexide group and 78 for the surgery alone group at 4 weeks postop.

Conclusions: Sulodexide is a glycosaminoglycan that can add benefits to the reflux corrective surgery in terms of shortening the time to complete heal, and improving the QOL of patients with leg ulcer associated to varicose veins.

Use of elatec (MPFF) as monotherapy for postoperative symptoms control after endovenous radiofrequency ablation
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Background: To determine that the micronized purified flavonoid fraction, after endovenous radiofrequency ablation, diminishes postoperative symptoms in patients with chronic venous disease.

Methods: Randomized trial comparing two groups: control group (endovenous radiofrequency ablation) and Elatec group (endovenous radiofrequency ablation with Elatec postoperatively). A complete CEAP classification, Venous Clinical Severity Score, Visual Analogue Scale of the postoperative symptoms (pain, heaviness, restless legs, swelling, paresthesia, and hematoma), and a CIVIQ-14 quality of life questionnaire was performed to determine postoperative symptoms.

Results: The study included 549 female patients treated with radiofrequency between January 2014 and January 2016: 275 in Elatec group and 274 patients in control group. The postoperative Venous Clinical Severity Score in the Elatec group was 2.4 points and in the control group was 5.1 points. The Venous Clinical Severity Score and the CIVIQ-14 quality of life questionnaires improved in both groups, but the scores improved significantly in the Elatec Group.

Conclusions: The majority of the patients with symptomatic chronic venous disease benefit from endovenous radiofrequency ablation of incompetent saphenous veins. The addition of Elatec in the postoperative period offers a simple, single drug management of the short-term postablative symptoms. The treatment improves the benefit of the surgery by reducing pain, heaviness, swelling and hematoma formation with no drug side effects.
GLUE ABLATION

New techniques for cyanoacrylate injection of saphenous veins and tributaries
Stefania Roberts, Ken Myers
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Background: Commercial cyanoacrylate (CA) is now available for direct injection under ultrasound guidance for saphenous veins or for tributaries deep to the surface. We have used cyanoacrylate embolization (CE) for more than 100 venous territories over the past 9 months for primary and recurrent varicose disease using Venablock and Veinoff polymers.

Methods: The proprietary mixture for Venablock polymer contains n-butyl cyanoacrylate (NBCA) while that for Veinoff polymer contains 2-octyl cyanoacrylate (OCA). The Venablock preparation is less viscous than Veinoff while Venablock polymerization is faster than for Veinoff, and either is selected on the basis of anticipated rate of injection. If treatment is required, these are now offered for saphenous reflux for veins <4mm diameter, deeper tributaries of any size, neovascularization and perforator reflux. Preparations are being developed for superficial tributaries. The Venaseal technique is preferred for larger saphenous veins.

Results: Preliminary results show an occlusion rate for long segments after a single session of treatment in more than 90% so that these forms of CE are now preferred to ultrasound-guided sclerotherapy (UGS) due to perceived better occlusion rates with fewer treatment sessions required. However, patient concerns include injection of a foreign substance and cost. Differences in technique compared to UGS will be described. Further development of these techniques promises to provide an alternative to UGS in many patients.

Experience with cyanoacrylate catheter embolization for saphenous reflux
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Victoria Vein Clinic, Melbourne, Australia

Cyanoacrylate embolization (CE) by the Venaseal catheter technique has been used to treat more than 200 refluxing saphenous veins over a 3-year period. N-butyl cyanoacrylate (CA) is delivered at 3cm intervals along the vein from 5cm distal to the saphenous junction under ultrasound guidance. CE is offered as preferred treatment for all patients requiring intervention for saphenous reflux with vein diameter ≥4mm. Reasons to prefer to endovenous thermal ablation (ETA) include no need for tumescent anaesthesia and quicker recovery, while it is considered to have more reliable outcomes compared to ultrasound-guided sclerotherapy. Reasons for refusal were concern as to embolism, dislike of having a permanent foreign substance implanted and cost. As a result, more than 700 veins were treated by ETA in the same period. Cumulative occlusion rates were similar in the two unmatched groups with 95% occlusion for CE at 12 months. Quality of life scores were significantly improved after CE. Recurrences were all for veins greater than 6mm diameter since when a double dose of CA is delivered for larger veins or at segments of dilation. Measurements of the upper end of occlusion shortly after treatment showed 90% were within the 5cm from the junction with just one protruding into the deep vein. Most patients had little post-operative pain or inflammation but 15% developed a significant inflammatory reaction along the vein, often just on one side after bilateral treatment.

Ultrasound appearances following cyanoacrylate adhesive (CA) closure of incompetent veins
Luke Matar
The Vein Clinic, Perth, Australia

Background: Cyanoacrylate adhesive closure of incompetent veins is gaining in popularity as a non-thermal treatment modality and some believe may eventually replace EVLA as the preferred primary treatment for incompetent saphenous veins. The rapid rise in popularity of this method however has not been matched with information regarding expected and unexpected appearances following treatment.

Methods: Follow-up ultrasound images from patients having undergone prior CA closure were retrospectively reviewed to determine the range of appearances encountered and significance of these appearances. Among other things the following was observed:
- Distance of CA from junction with deep vein (SFJ or SPJ) compared to expected position of CA
- Compleness of closure
- Echogenicity of CA
- Presence or absence of “flow channels” within the treated vein
- Degree of inflammatory change in the peri venous tissues
- Presence or absence of thrombus within branch vessels
- Changes in these appearances over time

Results: The presentation will take the form of a “pictorial essay” demonstrating the range of findings encountered following CA closure and potential significance of these findings.

Conclusions: Despite enthusiastic and aggressive marketing of CA closure, little is published about the expected and unexpected findings following treatment. This paper aims to lead the way to encourage further research in understanding the outcomes of this treatment and the role of ultrasound in monitoring and follow-up after treatment.

Direct injection of cyanoacrylate adhesive (DICA) to obtain closure of a proximal great saphenous vein (GSV) venous aneurysm (VA) following failed endovenous laser ablation (EVLA)
Luke Matar
The Vein Clinic - Perth Western Australia, Subiaco, Australia

Background: A 57yr male presented with an increasingly painful left “groin lump” and painful left leg varicose veins. Ultrasound showed the “lump” to reflect a thrombosed 30mm x 20mm GSV VA commencing 15mm below the SFJ. Gross incompetence of the GSV was noted as was extensive superficial venous thrombosis (SVT) with the GSV and branch varicosities. Thrombus was aspirated under local anaesthetic resulting in immediate symptomatic improvement and Clexane (subcutaneous LMWH) was administered at a dose of 1mg/kg BD for 6 weeks.

At six weeks, most of the GSV thrombus and all the VA thrombus had resolved and EVLA of the incompetent GSV was undertaken using the following parameters: 1470nm Radial Slim fibre, LEED proximal GSV to include VA=150j/cm, LEED elsewhere 75j/cm. Follow-up 4 days post EVLA showed successful closure of the treated GSV except for the VA. Three separate injections (0.2ml, 0.3ml & 0.2ml) of a viscous CA were then made directly into the VA under ultrasound guidance. The delivery mechanism was a 22g needle mounted on a 3ml leur lock syringe. Firm local manual compression was administered for 90 seconds following each injection.
Repeat ultrasound assessment was immediately performed after each injection to ensure successful closure. The first two injections resulted in partial closure and the third complete closure of the VA with cessation of color flow within the VA observed in real time. The VA remained closed at 6 weeks and further follow-up will be ongoing at 3, 6 and 12 months.

Conclusions: Although long term follow-up is awaited, short term follow-up in this case suggests that DICA may be worth considering as a treatment option in cases of failed endovenous VA closure.

Endovenous laser, sclerotherapy and vein gluing combined as a single catheter procedure for saphenous veins. Initial experience
Johann Chris Ragg
Angioclinic Vein Centers, Berlin, Germany

Background: Gluing of veins is discussed as being superior to thermoocclusive methods or sclerotherapy as it may achieve immediate and permanent vein closure. Furthermore, no tumescent anesthesia is required. However, approved gluing methods use continuous placement of aggressive and hardly resorbable cyanoacrylate (VenaSeal, VariClose, Venablock), while sparing the junction. Segmental glue application is preferred by some investigators meanwhile, but this leaves native endothelium and thus a source of relapse. All these drawbacks could be overcome by a new modality which combines endovenous laser for the junction, followed by segmental or pointwise gluing and catheter sclerotherapy.

Methods: 22 patients (16 f, 6 m, 42 – 72 yr.) with GSV insufficiency and diameters of 8 - 22 mm (mean: 9.2 mm), length 43 – 62 cm (mean 55.1 cm) underwent endovenous laser (940-1470 nm) for a 8 cm long junction segment (“laser crossectomy”), followed by a ScleroGlue® procedure, comprising sclerotherapy (Aethoxysklerol 1%, 1+4 with air) and acrylate spot gluing, using a single coaxial catheter access. No external compression media were used post treatment except a film bandage for superficial varicosities. Follow-up was performed next day and 2 – 6 – 12 months.

Results: All cases (22/22) showed immediate saphenous occlusion and reflux elimination. Day one examinations showed the saphenofemoral junction closed without any stump (22/22). Procedural time from first puncture to access closure was 9:30 – 15:30 min. (mean: 11:45 min). At one year follow-up, all cases showed total occlusion, including the junction.

Conclusions: Combining laser crossectomy and ScleroGlue®, optimal morphological and functional results could be obtained in this small initial experience. However, the procedure will not be suitable for cost-effective clinical routine application as long as there is no approved device available for e.g. less than 500 USD.

Venaseal™ (cyanoacrylate) for chronic saphenous insufficiency – early results of a single center experience in Australia
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Background: Cyanoacrylate is an innovative non-thermal alternative treatment for saphenous vein insufficiency. This novel technique was first described in 2011 with subsequent safety and efficacy for chronic varicose veins shown in 2014. This Australian observational single center study is aimed to assess the experience, efficacy and safety of Venaseal™ therapy.

Methods: 94 patients, mean age 57 years, 59% females with 145 limbs were treated for saphenous vein insufficiency from November 2014 to July 2017. Patients were assessed clinically by experienced vascular sonographers pre and post-procedure with a comprehensive duplex-scan. Scheduled follow-up visits were at 1 and 4 weeks, and then at 3, 6, 12 months and yearly to check for occlusion of targeted trunks. During 1 week scan patients were also checked for DVT.

Results: 197 trunks (GSV-143/ SSV-54) were treated of a total of 134 incompetent limbs. The average therapy duration of a full-length GSV was 30 minutes. Pain was rarely reported post-procedure. Mean follow-up is 19.6 months and no recanalization has been reported. There was 1 GSV segmentally occluded, related to technique factors and 5 cases of symptomatic thigh phlebitis requiring medical treatment with satisfactory resolution.

Conclusions: Venaseal procedure time is longer than ERFA. However, 100% of the trunks treated remain occluded during follow-up period, and it seems to be virtually pain free with no down time required.

Clinical outcome of ultra-rapid acting cyanoacrylate embolization compared with micro-pulsed laser ablation
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Background: Ultra-rapid acting n-butyl cyanoacrylate (uNBCA) is introduced as a new non-thermal and non-tumescent endovenous ablation modality. Micro-pulsed YAG laser (1320nm, 100 microseconds pulse duration) has also provided a more advanced thermal modality that provides painless ablation using a bare fiber. The aim of this study is to retrospectively compare uNBCA based ablation with endovenous micro-pulsed laser ablation (EMPLA).

Methods: Since June 2016, there were 120 patients with incompetent varicose veins who were treated with an endovenous embolization of uNBCA (N.=60) or EMPLA (N.=60). The preprocedural, intraprocedural, postprocedural and follow-up data of the patients was collected and restrospectively compared.

Results: The mean age was 63±11 in the uNBCA group and 68±10 in the EMPLA group. The average length of treated veins was 32.4±10.7 cm and 27.0±9.8 cm respectively, while 472±147 mL of tumescent anesthesia was used only for EMPLA. The average procedural time was 27.3±10.8 and 32.6±11.2 minutes respectively. uNBCA delivery was accomplished within 20 seconds during the target vein embolization, whereas it took a much longer 258±89 seconds in the EMPLA group. At the end of the treatment, all procedures were successfully occluded in the both groups, and the total occlusion rate was 96% and 100% at 6 and 12 months. The venous clinical severity score improved significantly with no quantifiable difference between groups. Postprocedural phlebitis was observed in 10 patients (17%) only in the uNBCA group, and the analgesic medication rate was significantly lower in the EMPLA group (0%) than in the uNBCA group (10%).

Conclusions: The uNBCA is a fast and effective treatment that saves procedure time, and is without tumescent, compression stockings and thermal damage. However, there is one minor pitfall; postprocedural phlebitis is more likely to occur after uNBCA than after EMPLA.
The treatment of great and small saphenous vein insufficiency using a cyanoacrylate glue: my experience
Patrizia Pavei, Maurizio Ferrini, Enzo Giraldi, Marcella Menegazzo
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**Background:** The treatment of saphenous veins insufficiency has undergone a substantial change in the last years. A new method using a Cyanoacrylate glue, has recently been approved being as efficacious as endothermal ablation, without the need of perivenous tumescent anaesthesia (TA). The aims of the study were to evaluate the complete occlusion of the treated vein and the incidence of post-procedural pain and complications.

**Methods:** 52 patients (55 saphenous veins: 49 great and 7 small saphenous veins) were enrolled in our department between November 2015 and June 2017. The inclusion criteria were: insufficiency of the great or small saphenous vein, a diameter while standing of 5-12mm, a navigable trunk, no previous history of DVT, PE or thromboflebitis. The patients underwent the treatment following the known protocol published in previous papers. We decided to treat at the same time the visible varicose branches by phlebectomies under TA. All the patients wore a II class elastic stocking for 1 week.

**Results:** Patients underwent a clinical and echocolodoppler examination at day 3, day 7, at 3 months and 1 year. The presence of pain, the use of pain killer and the occlusion of the vein were reported. At day 3 none of the patients experienced pain in the treated trunk, while 22 out of 50 patients experienced light to mild pain in the site of phlebectomies. At day 7, 6 patients reported some discomfort along the treated trunk, that did not required the use of pain killers, while 5 patients, 4 at day 10 and the other at day 14, had an intense inflammatory reaction that required antinflammatory medication for 5-7 days. The occlusion rate at day 3 and 7 was of 100% with a residual competent stump 1 to 5cm long. At 3 months 3 cases out of 52 patients had a refluxing stump. We did not have any DVT. At the 3 months visit, all the patients stated that they would have chosen again this kind of treatment except 2.

**Conclusions:** The use of the cyanoacrylate adhesive is safe, effective and simple. The possibility to treat more than one saphenous vein in the same session, could be very attractive with a rapid return to work. Longer follow-up are needed to compare this new method with the other endovascular treatments.

Direct injection of cyanoacrylate adhesive into perforators (DICAP)
Luke Matar
The Vein Clinic - Perth Western Australia, Subiaco, Australia

**Background:** To describe a modification of the standard Venaseal™ technique for the treatment of small diameter incompetent straight veins.

**Methods:** One problem the author encountered with use of the Venaseal™ closure device was that manipulation of the blue 7Fr introducer sheath over the guidewire induced venous spasm in small diameter (<5 mm) veins to the degree the procedure could not be performed in several cases when trying to treat incompetent anterior accessory saphenous veins. In subsequent cases, vasospasm has been avoided by directly advancing the 5 Fr glue catheter through a 7Fr diameter micro-introducer sheath. The 5 Fr glue catheter is quite fragile and prone to kinking but with careful and gentle manipulation of the glue catheter, treatment of straight veins as small as 2mm has been accomplished without difficulty.

**Results:** In addition to saphenous veins, anterior accessory saphenous veins and incompetent straight saphenous branches and post stripping incompetent below knee GSV segments have been successfully treated using both antegrade and retrograde approaches.

**Conclusions:** Straight veins smaller than 4mm in diameter may be successfully treated with Venaseal™ by modification of the standard technique as described above.

Modified Venaseal™ technique for treating small diameter straight veins
Lake Matar
The Vein Clinic - Perth Western Australia, Subiaco, Australia

**Background:** To describe a modification of the standard Venaseal™ technique for the treatment of small diameter incompetent straight veins.

**Methods:** One problem the author encountered with use of the Venaseal™ closure device was that manipulation of the blue 7Fr introducer sheath over the guidewire induced venous spasm in small diameter (<5 mm) veins to the degree the procedure could not be performed in several cases when trying to treat incompetent anterior accessory saphenous veins. In subsequent cases, vasospasm has been avoided by directly advancing the 5 Fr glue catheter through a 7Fr diameter micro-introducer sheath. The 5 Fr glue catheter is quite fragile and prone to kinking but with careful and gentle manipulation of the glue catheter, treatment of straight veins as small as 2mm has been accomplished without difficulty.

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**Conclusions:** Straight veins smaller than 4mm in diameter may be successfully treated with Venaseal™ by modification of the standard technique as described above.

The Vein Clinic - Perth Western Australia, Subiaco, Australia
HEMODYNAMICS

Hemodynamic changes after varicose vein surgery
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The objectives of varicose vein tests are anatomic localization and quantification of the reflux. Ambulatory venous pressure (AVP) has been used for the evaluation of venous hemodynamics. AVP is measured by inserting a needle into a vein on the dorsum of the foot, which is connected through a pressure transducer and the hemodynamic parameters are measured. Because of invasiveness, it cannot be repeated frequently nor be used as a screening test. Air plethysmography (APG), first introduced by Christopoulos et al., is a noninvasive technique, which can measure relative volume changes in the lower limb in response to postural alterations and muscular exercise. The results of APG have been shown to correlate well with AVP and it has been used for measuring the quantitative hemodynamic information of varicose veins. APG can be used in conjunction with duplex ultrasound to provide better information concerning venous function. Duplex ultrasound is the most useful examination for evaluating venous valvular incompetence, but it provides relatively little quantitative hemodynamic information. Several studies have been shown that APG is useful to diagnose and quantify venous reflux and to evaluate the clinical severity of chronic venous insufficiency. APG provides reproducible hemodynamic measurements that can be evaluated noninvasively in serial examinations. APG is now widely used for the preoperative examination of varicose veins, but there are only few studies that have compared the hemodynamic changes in varicose veins before and after operation. The published results of the comparative data of hemodynamic improvement between treatment modalities are limited.
Our study was conducted to assess the hemodynamic changes after varicose vein surgery by means of air plethysmography and to compare the hemodynamic changes according to the treatment modalities.
COMPRESSION

Shape memory textiles for functional compression management
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In compression therapy by using textile products such as bandage, there exists huge challenge to manage the level of pressure during the course of compression. Moreover, achieving target level of pressure is also difficult during wrapping because of varying circumference and stiffness for different limbs. This work relates to the development of a smart compression system using shape memory polymeric filaments. Smart filaments are incorporated in the structure of stocking which allows controlling the level of pressure externally at ambient conditions. Experimental results showed that the pressure can be controlled by supervising the surface temperature of stocking. Extra pressure generated by the stocking depends on the level of temperature and initial extension (P<0.05). The shape memory compression system could have immense potential for compression management as this would give more freedom to govern pressure level whenever needed during the course of compression therapy.
Floating thrombus at GSV junction – a chance of instantaneous endovenous repair
Johann Chris Ragg
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Background: A 75-year-old male patient (former general practitioner) presented for ultrasound examination with moderately symptomatic varicose veins. Incidentally, a floating egg-shaped thrombus was found at the right saphenofemoral junction. Thrombus size was 14 x 7 x 6 mm, located within the clearly refluxive GSV of 9 to 16 mm diameter. Due to the aspect with threatening embolism, the decision was to go for immediate treatment.

Treatment options were: 1) Surgical thrombus extraction with removal of the diseased GSV, 2) an interventional approach by thrombendarterectomy, anticoagulation and elective GSV closure, or 3) an endovenous one-step procedure with thrombus fixation and thermo-occlusion, for which patient and interdisciplinary conference decided.

In a first step, the SFJ was narrowed by ultrasound-monitored perivenous saline (Klein solution), injected with a 21 G needle (120 mm) in coaxial approach. A PTFE catheter (PhleboCath®, 2.3 mm) was positioned distal to the thrombus. Using a 810 nm laser device (12 W, Meldon) and a 600 micron spherical fibre, the thrombus was fixed by means of coagulation. Finally, the diseased GSV was occluded with the same laser (80-120 J/cm). The final images showed exact closure off the GSV with laminar femoral flow. Discharge with Clexane 2 x 20 mg s.c. for 3 days, and compression stocking class II.

The postinterventional period (follow-up: 2-4-8 weeks) was asymptomatic except a minor discomfort along the treated vein, not limiting any activities and not requiring medication.

Conclusions: The reflux in the SFJ and orthograde flushing by the inferior epigastric vein seem to be the main factors of this particular thrombus formation. Surgical thrombus removal would have been the standard choice, offering reliable prevention of embolism. Interventional thrombendarterectomy is less safe. Furthermore, a large and phlebitic GSV may be better suitable for surgical extraction. However, the chosen strategy to fix the thrombus and then endovenously occlude the GSV is as well highly safe to prevent embolism. Furthermore, it is minimally invasive, requires just local anesthesia and allows immediate ambulation.

Ultrasound guided sclerotherapy of mayor saphenous vein aneurism
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Background: The venous aneurisms present a single duct communicated with the other vein structures. This is a non-frequent pathology, its incidence is about 3 of 100 patients and the typical sign is the venous wall three layers affection.

The diagnosis is made by Doppler ultrasound, which allows to identify localization and size of the aneurism. It’s very important to make differential diagnosis and to recognize possible complications.

Female, 54 years old, teacher, family history of varicose veins. She mentioned, she has had a trauma because of a car accident five years ago. She presents chronic venous insufficiency (CEAP 5) and she has a 1/3 superior right tumor on her left leg.

The Doppler ultrasound informs:
- Mayor saphenous vein insufficiency
- Minor bilateral vein insufficiency
- Left aneurysm image at 1/3 superior mayor saphenous (3.01 cm x 1.96 cm)

The treatment used was foam ultrasound guided sclerotherapy with tetracycl sodium sulfate 3%. One session per week, during three weeks. After four month treatment, the pathology was solved.

Conclusions: Venous aneurism at saphenous vein is very infrequent. It appears incidentally during a physical exam. The elected diagnosis method is the Doppler ultrasound. The foam ultrasound guided sclerotherapy is a very effective and resolutive treatment.

A case of varicose recurrence by a popliteal fossa perforating vein, after chemical ablation of the small saphenous vein
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Background: High ligation of small saphenous vein (SSV) multiplies by 5 the risk of pathological perforator of the popliteal fossa (PPF). Moreover, in one quarter of cases of recurrences after high ligation and stripping of the SSV, one finds pathological PPF.

Thermal and chemical endovenous ablations are replacing traditional surgery in the treatment of SSV insufficiency. This clinical case shows a significant varicose recurrence, occurring quite rapidly after effective chemical ablation of SSV.

A 53-year-old woman was treated in December 2015 for SSV insufficiency (trunk diameter 7 mm). At the 10-days control there is an occlusion of the SSV over 15 cm in length. In July 2016, there was a small, medial, supra-fascial recurrence, which seems to be a tributary of the junction. In January 2017, the tributary is 4 mm and the reflux is actually fed by a lateral PPF (accompanying artery); the patient is reviewed for the treatment on April, 15th and the perforator reaches 6 mm diameter and tributaries even more extensive.

A foam sclerotherapy treatment is performed and the control on May, 15th finds a good occlusion of the perforator and tributaries.

Conclusions: The frequency of recurrences through an anterior accesses Great Saphenous Vein (GSV) after endovenous ablation (EA) of GSV is now recognized. Although hemodynamic conditions are not quite identical (junctional recurrences for GSV, non-junctional recurrences here), it seems that PPF recurrences may be expected, more or less early, after effective EA of SSV; suppression of superficial drainage coinciding with the abnormal hemodynamic forces in the popliteal fossa result in adaptive dilatation of perforator and development of pathological reflux and varicose recurrence. Treatment by foam sclerotherapy seems effective.

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INTERNATIONAL ANGIOLOGY
Subcutaneous fluid collection after endovenous radiofrequency vein ablation of the saphenous vein: a rarely described complication
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Background: Endovenous procedures, including radiofrequency ablation (RFA), have replaced the majority of classic venous surgery techniques. Ease of use, good outcome and an early return to normal activities are just a few of their valued positives. RFA is generally accepted as a very safe procedure with rare severe complications. However, as in all surgical interventions, complications may occur. Our case report describes a very rare complication: a seroma.

36 year-old man, a healthy butcher, with positive family history of varicose veins, gradually developed a complete varicosis of long saphenous vein (LSV) with typical symptoms. Based on duplex ultrasound examination (LSV diameter 9.2-9.8mm, reflux in SFJ over 3 seconds), an RFA technique using Olympus/CELON bipolar system was indicated and performed in tumescent anesthesia. Immediate mobilization with medical grade class 2 compression stocking followed. Control on the 3rd postoper. day showed slight palpation sensitivity over the LSV in lower thigh. 21st day after surgery a non-painful elevated resistance with 5 cm in diameter developed dorsally from the treated vein, about 12 cm above knee level. Duplex US demonstrated a subcutaneous fluid collection with surrounding hyperechogenicity. Needle aspiration of the collection allowed a complete evaluation of the clear yellowish fluid (5cc). A local compression for 10 days followed. The aspiration was then necessary to repeat twice more in the next 20 days. Finally, we succeeded with eccentric Fegan-like compression with rubber inlay. Controls after 1, 2 and 3 months without recurrence.

Conclusions: Seroma after RFITT endovenous procedures is a rare but possible complication, hematomas seem more frequent. Between 2014-2017 we performed around 1350 RFITT of saphenous veins. A seroma was observed in one case only and was easily treated with needle aspiration and compression.

Complex telangiectasias connected to asymptomatic refluxing saphenous vein: endovenous ablation followed by clacs guided by augmented reality
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Background: 55 years old female patient, asymptomatic, complaining about telangiectasias on the inner side of the right knee that wouldn’t respond to sclerotherapy or laser. During the consultation (private) the need of an ultrasound scanning was exposed. She refused initially to pay but it was explained that even though she was asymptomatic, she might have a reflux that was impeding the outcome. She accepted and the ultrasound showed a continuously refluxing great saphenous vein. Patient was submitted to endovenous laser ablation with 1470nm radial fiber laser followed by phlebectomy of the tributaries. It is important to observe that this is a case of thermal ablation in an asymptomatic patient. The patient was complaining about poor quality of life due to the appearance of her legs and due to exercises and good calf pumping, she had no symptoms. This type of treatment is classified as aesthetic phlebology and at least part of it needs to be paid by the patient.

30 days after the procedure, we started to treat the remaining telangiectasias and feeder veins with CLaCS (cryo-Laser and Cryo-Sclerotherapy) guided by augmented reality. A total of three CLaCS sessions were performed. The laser used was a ND:Yag 1064nm, 6mm soitsuzo, 15 milliseconds laser. The average fluence used was 70J/cm2 and CLaCS was performed on the telangiectasias and its causative feeder veins. Compressions stockings (compression class 1) were used in the first 10 days and the interval between CLaCS sessions was 30 days. This before and after photo shows the appearance before and after 4 months.

Conclusions: This before and after photo shows the appearance before and after 4 months. This case opens the discussion about the treatment of asymptomatic refluxing saphenous veins to improve patient’s quality of life.

Air embolism following sclerotherapy
Douglas Hill
The Vein Treatment Center, Calgary, Canada

Background: This is a case report of a cerebrovascular accident in a 74 year old woman following small volume foam sclerotherapy. The patient was a healthy woman with no history of migraine or neurological problems. The incident occurred in association with her seventh direct vision sclerotherapy treatment after injection of 1.1 ml of air based sclerosant foam. While still in the clinic she developed an acute left sided hemiparesis and facial droop, right gaze deviation and dysarthria. These symptoms resolved in less than one hour and her neurological exam normalized. CT scan several hours later demonstrated air in the right middle cerebral artery. Magnetic resonance imaging showed a small acute infarct in the right parietal lobe.

Conclusions: This case illustrates that very low volumes of sclerosant air foam can lead to significant neurological complications. Elderly patients may be at increased risk for neurological events following foam sclerotherapy and extra caution is advisable, particularly when using air based foam.

First experience for iliac vein stenting by coronary balloons in a young case of reverse May-Thurner syndrome
Mehrdad Honarvar
Shiraz Vein Center, Shiraz, Islamic Republic of Iran

Background: Leg ulcer needs to a comprehensive evaluation. In some cases, leg ulcer is not due to reflux and pathology is obstruction. The pt is a case of 24 Y/O with chief complaint of Rt leg ulcer since 4 years ago. He claims; without any risk factor; developed leg edema suddenly; after that; with impression of Rt leg DVT had been started warfarin; but clinical result was very poor. Finally; he discontinued anticoagulants and stocking. We assess the pt by ultrasonography and MRV; result was very interesting: Rt ext Iliac vein stenosis (Reverse May-Thurner syndrome). His procedure of iliac vein stenting was very difficult: totally obstruction of Rt Ext. Iliac vein; for first time, we used coronary wires and balloons for iliac vein stenting with excellent result.

Conclusions: Iliac vein stenting can result in wound healing.

Case presentation of mismanaged EVLA and what went wrong
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Background: though EVLA is a very known technique and it has been performed all around the world but mistakes and mismanagements are very regular and unfortunately, is not presented and reported adequately.
Patient attended the same clinic with venous insufficiency and underwent bilateral EVLA of GSV under LA.

After the procedure, his complains have increased and larger varicose veins started to appear on both legs. Patient returned for second opinion, by examining his file and US findings such discrepancies were observed; Stocking prescribed 2 sizes larger; US previously performed in flat position and the findings were severe insufficiency of both GSVs. Repeating US in semi standing position findings showed both GSV were open from SFJ for around 12 cm and also from knee to ankle showing severe reflux, multiple Accessory veins and both SSV showed severe reflux with multiple varicose veins with communication to superficial veins and also perforators.

Patient underwent EVLA of Left GSV, Accessory GSV, second Accessory GSV, SSV with miniphlebectomy and EVLA of Right GSV, Accessory GSV with miniphlebectomy, followed by foam sclerotherapy under LA with one month interval.

Patient attended work next day after each procedure with complete satisfaction and full recovery.

**Conclusions:** To assure best operative result Ultrasound investigation is the most essential tool. Partial treatment of defected veins is not the solution.

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**A difficult diagnosis**

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**Background:** A planar thrombosis is believed to be rare, and is therefore far too rarely considered. The clinical picture is misleading, since the circumstances that trigger the condition are often complicated and appear to point to osteo-articular aetiology.

Mrs Angèle G, aged 48, had no history of thrombo-embolism, but underwent a rotator cuff operation. She was hospitalized and bed-ridden for three weeks. Upon discharge, she felt a sharp pain in the back of her right foot. The foot then swollen up and she was unable to use it. An emergency Doppler ultrasound proved negative. The Wells score confirmed a low probability of thrombosis, so investigations were stopped and she was treated with anti-inflammatory.

The symptoms worsened, however, After 48 hours, the patient was unable to move the leg and was in great pain. A rheumatological origin was investigated. Bone X-rays proved normal but the MRI results stated: “images of the sub-cutaneous soft tissue of the instep appear inflamed”. A Doppler ultrasound concluded: “total occlusion of two planar veins with a 10 cm extension a posterior tibial vein”.

Heparin treatment was prescribed. The pain lessened and she was able to use the foot in a few days. The literature will be briefly surveyed, stressing the basic reasons for the treatment, which remains non-consensual.

**Conclusions:** This diagnosis should be routinely considered. The Doppler ultrasound examination is the “gold standard”, for exploring the venous system, avoiding mistakes and saving cost and time.

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**Resilient telangiectasis on the thigh:** successful treatment of the feeder veins and telangiectasis with clacs guided by augmented reality

Kasu Miyake

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**Background:** Patient 41yo, female, with no disease and 3 pregnancies complaining about telangiectasis on the legs that wouldn’t respond to sclerotherapy or transdermal laser. She had no complaints about edema but described heaviness on the thigh during long days. Ultrasound examinations showed normal saphenous veins and no relevant perforant veins. Photo-plethysmography was normal too.

Patient was submitted to 2 CLaCS (Cyo-Laser and Cryo-Sclerotherapy guided by augmented reality) sessions in 2011 and reported that she could be able to expose her legs during summer. In 2012 she was submitted to 3 extra sessions. The before and after photo shows her thigh appearance prior to treatment in 2011 and when she came back for maintenance in 2014.

**Conclusions:** The CLaCS treatment of the telangiectasis and all veins that the augmented reality device showed led to the treatment of the resilient telangiectasis with long lasting result. There is much to be studied about the treatment of veins that are too deep for naked eye visualization and too shallow for ultrasound detection.

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**Case Report of successful management of recurrent thromboembolism in woman with inherited thrombophilia**

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**Background:** A 47-year-old Caucasian woman with a previous medical history of pulmonary embolism and deep vein thrombosis (DVT), two pregnancy losses and one episode of intrauterine growth retardation, was diagnosed with recurrent pulmonary embolism and DVT in 2015. She reported that, after a first episode of pulmonary embolism and DVT (2010), thrombosis prophylaxis was done using aspirin (75mg daily). Despite of anti-coagulation therapy, recurrent episode of thrombembolism was developed. For detection of inherited thrombophilia (Factor V Leiden (FVL), Prothrombin (PT) G20210A) and Methylenetetrahydrofolatereductase (MTHFR C677T) gene mutations) were used PCR analyses. By investigation was detected very rare genotype: triple heterozygous form of FVL/PT/MTHFR mutations. After detection of second episode of thromboembolism and inherited thrombophilia, anti-coagulation was initiated with NOAC (Rivaroxaban) 20 mg once a day. Till now, no any recurrent episode of thromboembolism was observed.

**Conclusions:** We consider necessary to prolong proper anti-coagulation therapy in the group of patients having inherited thrombophilia, especially combined forms of mutations, to prevent recurrent thrombosis and avoid complications, such as fatal thromboembolism of pulmonary artery or post-thrombotic syndrome.

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**Endovenous therapy for vascular malformation of a teenage with history of infantile Kasabach-Merrit syndrome**

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**Background:** Kasabach-Merrit syndrome (KMS) is a rare condition in infant, characterized by the combination of rapidly growing vascular malformation (VM), thrombocytopenia, microangiopathic haemolytic anaemia and consumptive coagulopathy. Literature report of this syndrome were mainly on initial presentation and medical management at infant stage. Little has been published on the subsequent management of the involved VM at or after teenage.

We report a case of 19 years old male, with history of Kasabach-Merrit
syndrome at infant. He presented with a 27 cm vascular tumor in his left thigh at birth, resulting in heart failure, thrombocytopenia, consumptive coagulopathy, haemolysis, and neonatal jaundice. His medical condition was stabilized with aggressive medical treatment. MRI of the vascular tumor at that time showed extensive involvement of cutaneous and subcutaneous, with mild muscular involvement. However, there was extensive arterial-venous shunting, with feeding vessels from the Common Femoral Artery. The VM was managed conservatively in view of the complicated anatomy. The VM persist into teenage, but with minimal symptoms initially at childhood. However, symptom of leg pain and swelling progress which warrant more aggressive treatment. Follow-up imaging with MRI, Duplex ultrasound showed mainly venous malformation with cutaneous and subcutaneous involvement only, with the arterial element regressed. The VM was treated with Endovenous Radiofrequency Ablation + Ultrasound Guided Sclerotherapy with good result.

Conclusions: For VM which progress from infant as KMS, the arterial element of the VM may regress with time. The persistent venous malformation can be treated safely with modern endovenous therapy.

When the vascular surgeon meets the urologist: hybrid treatment of a vascular malformation of the bladder

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Background: Diagnosing and treating a congenital vascular malformation (CVM) can be a real challenge. The abnormal vascular anatomy in combination with a difficult accessible location site and a minimum of treatment options, make a multidisciplinary approach mandatory. An 11-year-old girl with no medical history was admitted at the Emergency Department of our Hospital with a hemoglobin count of 4.3 g/dl due to massive macroscopic hematuria. After extensive examinations, a large low flow vascular malformation of the bladder and uterus was diagnosed. Three treatments with cystoscopic assisted and one treatment with laparoscopic assisted injection of 1% polidocanol foam (14 ml, 16 ml, 8 ml and 10 ml) were performed to stop the acute bleeding and regress the extent of the malformation. In addition, a hyperselective endovascular embolization of the left ureterine vein with 10 ml Onyx20 was done to treat the laparoscopic and cystoscopic inaccessible parts of CVM. Each therapy session was followed by 24 hours of intermittent pneumatic compression of the lower extremities to avoid postoperative complications. There was no recurrence in the next 4 years follow-up.

Conclusions: Ultrasound Guided Foam Ablation is an established treatment for low flow venous malformations. However, when the CVM is extensive and not easily accessible, out of the box treatment with combined cystoscopic and laparoscopic assisted foamablation and endovascular embolization will cool down the venous malformation in the end without invasive surgery.

Endovenous thermoablation of great saphenous vein in patient with Parkes Weber syndrome

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Background: Parkes Weber syndrome (PWS) consists of capillary, venous, lymphatic, and arteriovenous malformations (AVMs). It offers well-defined clinical presentation and evolution. The complications have high morbidity, frequently with chronic ulcers and even amputation of the affected limb. The treatment of arterial complications is often performed by embolization. There are no reports of treatment of super- ficial venous system by thermoablation. The objective of this study was to report a case of treatment complications in a lower limb from a PWS patient with embolization and thermoablation.

Methods: This is a case report. Results: J.J.S., a 20-year-old female, was seen in our service 2 years ago with an ulcerated lesion on the medial aspect of the left ankle. She had a previous history of orthopedic surgery, embolizations of the tibial posterior artery and AVMs, and chemical ablation of great saphenous vein (GSV) and perforate veins with polidocanol foam in left lower limb. Physical vascular examination of the affected limb showed absence of posterior tibial pulse and presence of palpable dorsalis pedis pulse. Duplex scan showed spontaneous pulsatile flow and reflux after a decompression maneuver of GSV, perforate veins and collateral varices. Angiography showed a large GSV throughout the member, with the largest in the distal third of leg. Embolization of the AVMs in the thigh and, 2 months later, in the leg was done. It was associated with elastic compression. The leg ulcer evolved with healing, but after almost 60 days, the ulcerative lesion recurred. It was recently chosen to treat the GSV reflux with thermoablation using a 1470-nm laser with double-ring fiber and tumescent local anesthesia. The ulcer healed in less than 4 weeks and the patient has been followed by one year.

Conclusions: The treatment of GSV with thermoablation in PWS patients is easy to perform and appears to have a favorable prognosis, thereby promoting better aesthetic aspect of lesions and quality of life, but the long-term results are not yet well-defined.

The incompetent middle-thigh perforating vein treatment

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Background: Female 51, 23 BMI, complained of the presence of varicose veins on the inside of the thigh, knee, and front of the leg. CEAP: C 1,2, A, Ep, As, P, Pr, 2,17, LII 04.06.2016; VCSS: 3; Aberdeen: 12. The length of the extended great saphenous vein (GSV) segment from incompetent perforator to varicose tributaries of the thigh was about 5cm, diameter up to 6mm. The diameter of the perforating vein up to 5.5mm. The intervention was conducted: Endovenous laser ablation of the incompetent middle-thigh perforating vein with tributaries phlebectomy under local anesthesia. The ulcer healed in less than 4 weeks and the patient has been followed by one year.

Conclusions: The perforating vein catherization performed through a perpendicular puncture in the lateral GSV wall. Bare type fiber was applied. Local tumescent anesthesia - 20 mL of 0.5% solution lidocaine. The vein was treated with 1470nm laser, 7 W, manual traction with speed of 1 mm/s, Linear energy density LEED=70 J/cm. The laser is switched off short 5mm to GSV. This phase of the operation took about 4 minutes, then held phlebectomy Muller. The next day, the GSV pathological reflux wasn’t detected during the functional tests. Perforator was completely obliterated.

Conclusions: Incompetent middle-thigh perforating veins are a frequent source of varicose veins formation in the great saphenous vein system without saphenofemoral reflux. Surgical ligation of these veins requires the large incision and accompanied by the less cosmetic result. The endovenous thermal ablation usually held for a secondary incompetent segment of GSV, but the residual primary incompetent perforating vein in some cases becomes a cause of recurrence. A case of successful treatment demonstrates the ability to conduct an effective antireflux endovascular procedure without GSV obliteration.
A case presentation of pulsatile varicose vein
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Background: Pulsatile varicose veins are considered to occur from tricuspid valve regurgitation or arterio-venous malformation and fistulae. Chronic venous insufficiency (CVI) with pulsatile varicose vein is rare and treated case by case. In the era of endovenous treatment for varicose vein, our experience of the treatment for CVI with pulsatile varicose vein is presented.

84 years old woman complained of heaviness, swelling, itching of left leg since one year ago. She was diagnosed of CVI with congestive heart failure, atrial fibrillation and allergy of contrast.

Left leg was classified into C2,3,4a CEAP classification with pulsatile great saphenous vein (GSV) and corona phlebactatica without deformity. Chest X-ray, ECG and Cardiac echo showed Af, cardiomegaly with severe tricuspid and mild mitral valve regurgitation.

Venous duplex scan showed axial GSV reflux from sapheno-femoral junction (SFJ) to above ankle level. Distal pulsatile venous flow was detected in both superficial and deep veins down to middle calf level.

Treatment: First operation, endovenous ablation (1470nm Diode laser) of GSV from SFJ to middle calf level, was performed. One day after endovenous ablation, GSV above Hunter level were recanalized. Second operation, ligation of Hunter perforator and GSV at SFJ was done.

One year Follow-up: No symptom of CVI, no varicose veins, however, pulsatile distal flow in bilateral deep veins was detected.

Conclusions: The optimal treatment of CVI with pulsatile varicose veins due to tricuspid regurgitation in this case was a combination of endovenous ablation and surgical ligation.

The challenges of the difficult leg. how do i treat them?
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Background: New Zealand, a small country in the South Pacific, has a population of about 4,500,000. The Gisborne region is home to around 43,000 with over 20,000 being of Maori ethnicity.

In Gisborne varicose veins (VV) are a major medical issue in the Maori population. The venous hypertension, venous eczema, lipodermatosclerosis and ulceration are disorders that are frequently seen and affect patient’s well-being for many years.

The combined treatment of Endovenous Laser Treatment (EVLT) and Ultrasound Guided Sclerotherapy (UGS) is effective in treating the “difficult leg”. This is life changing and cost effective management compared to the old stripping and multiple avulsions.

We discuss a few difficult cases with extreme varicosity including a severely ulcerated leg with Polio, and the remarkable, life-changing recovery they made following Endovenous Laser Treatment and UGS.

Conclusions: This combined treatment proves the extraordinary value for patients affected by debilitating varicosity. These cases studies are a snapshot of the “difficult leg” in Maori and the phenomenal effect it can have on decreasing patient morbidity in New Zealand.

Can portal vein recanalization recover chronic intestinal dysfunction of extrahepatic portal vein obstruction (EHPVO)?
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Background: In this article we described a young case suffering from chronic intestinal dysfunction led by extrahepatic portal vein obstruction (EHPVO) which was not cured by portal vein recanalization.

A 22-year-old male presented for acute abdominal pain and dyspepsia for two weeks without heartache on August 2016 and was diagnosed as EHPVO. Contrasted computed tomography (CT) revealed portal and superior mesenteric vein thrombosis with cavernous transformation. Systemic anticoagulation therapy was chosen because cavernous transformation is the relative contraindication of intraluminal catheter directed thrombolysis (CDT). His abdominal pain was relieved but still complained dyspepsia. Upper gastrointestinal series (UGI) revealed upper jejunal dysfunction with incomplete intestinal obstruction. Intestinal segmentectomy was suggested but was refused and he accepted CDT in another institute. Although portal and superior mesenteric vein were partly recanalized, the intestinal obstruction was not alleviated. An emergent enterectomy was performed because of severe heartache. At the site of 70 cm distal to Treitz ligament, jejenum dilated to 10cm with edematous and rigid walls. Unfortunately, the patient suffered serious systemic infection, severe thrombocytopenia and desseminated intravascular coagulation (DIC) after enterectomy. Stool culture revealed pseudomonas aeruginosa infection which was assumed to intestinal bacterial translocation and serious malnutrition. Fortunately the infection was controlled endly.

Conclusions: If there is chronic intestinal dysfunction of EHPVO, portal vein recanalization may not be capable to recover intestinal function. Timely enterectomy may prevent intestinal bacterial translocation and serious malnutrition.

The endovascular therapy of Budd-Chiari syndrome
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Background: To explore the experience of endovascular treatment of Budd-Chiari syndrome (BCS).

Methods: Retrospectively analysis the clinical material of 345 cases of BCS. Puncture, percutaneous transluminal angioplasty (PTA) and vascular stent implant were performed, respectively. Three-dimensional digital subtraction angiography (3D-DSA) techniques were used in complex BCS cases.

Results: Four cases were failed to puncture the inferior vena cava (IVC) and then underwent veno-atrial graft shunt (N.=3) or radical resection (N.=1). Ten cases secondary thrombi in the distal of IVC lesion were performed catheter-directed thrombolysis firstly. Endovascular treatment was performed in three to fifteen days later. One case occurred IVC pericardium inner segment rupture and acute pericardial tamponade during balloon dilatation, the others were successful punctured and dilated. The pressure of IVC was decrease from 35.33±3.9cmH2O to 9.49±2.0 cmH2O (t=43.68, P<0.0001). The follow-up duration was 3 months to 46 months and mean 28.6 months. One case was found IVC stent thrombosis and performed veno-atrial graft shunt 15 months post-operatively, the others were no stent migration and hepatic venous obstruction. The pericardial tamponade case was recovery and discharged after IVC repaired. There were no pulmonary embolism and death.

Conclusions: Good late-term and mid-term effect could be acquired.
Endovascular management of Budd-Chiari syndrome with IVC obstruction
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Background: Budd-Chiari syndrome (BCS) is defined as hepatic venous outflow obstruction at any levels from the small hepatic veins (HV) to the junction of the inferior vena cava (IVC) and the right atrium. Accurate diagnosis and treatment should be extremely important. BCS is briefly classified as three types: pure obstruction of HVs, pure obstruction of IVC, and combined obstruction of HVs and IVC. Most often, symptoms develop slowly over a period of weeks or months. Generally, BCS is characterized by liver enlargement, ascites, and abdominal pain. Varicose veins of both lower extremities are often accompanied with IVC total occlusion, and often were misdiagnosed with conventional varicose veins of lower extremity.

Patient: Z.S, male, 58 years old. Chief complaint: fatigue, anorexia, abdominal distension for more than 3 years and melena for 1 months. History: fatigue anorexia without obvious inducement 3 years ago, to check liver function abnormal in the local hospital, abdominal CT showed: liver cirrhosis, splenomegaly and ascites, symptoms improved after medical treatment in another local hospital, abdominal ultrasound examination showed: Budd Chiari syndrome. Diagnosis of Budd Chiari syndrome was confirmed by inferior vena cava angiography. We performed PTA of the inferior vena cava and performed embolization of the gastric coronary vein, and the patient recovered well after endovascular treatment.

Conclusions: To avoid the Budd Chiari syndrome misdiagnosed as double varicose veins of lower extremity
Endovascular therapy is the first choice in the treatment of BCS

A report of 2 complicated cases of injury of inferior vena cava (IVC)
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Here we report 2 complicated cases of injury of inferior vena cava, which were treated in our center. Case 1. A 65- years- old male patient with right kidney stones was admitted for a nephrostomy tube misguided into IVC for 20 days. After short period time of preparation, the tube was tried to withdrawn slowly under the supervision of ultrasound scanning. However, a floating thrombus was detected in the IVC, just above the renal vein. The withdrawing of tube had to be stopped. A retrievable IVC filter was deployed in the retrohepatic IVC. Then, the tube was withdrawn successfully without hemorrhage. Anticoagulation was used post-operatively. The IVC filter was retrieved 2 weeks later. Ultrasound scanning suggested that his IVC and right renal vein were normal 4 months after the procedure. Case 2. A 41-year-old female patient was admitted for severe abdominal trauma after falling for 1 day. Before his admission, a exploratory operation was performed. Severe injury of the IVC and rupture of duodenum were found. A temporary shunting of IVC was made with a thoracic draining tube. Then, the patient was transferred to our hospital. An emergency operation was carried out. However, a large-caliber conduit was not available at that time. Two 8mm-PTFE conduits were put side by side, and their ends were sutured to make a larger one. Then, the modified conduit was used to reconstruct IVC. Later, the duodenum was repaired, and gastrostomy, cholecystostomy and jejunostomy were performed. The patient recovered smoothly.

A sticky situation: chylous ascites and lipiodol
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Background: Chylous ascites is a rare complication after abdominal surgeries like an abdominal aortic aneurysm (AAA) repair. It has a high mortality leading to electrolyte derangement, malnutrition and infection. Fortunately enough in most cases, conservative treatment is successful and often resolves. However, in some circumstances preoperative imaging of lymph leakage and surgery may need to be considered if the course is not progressing.

We herein report a case of a 67 year old man who developed massive chylous ascites [2-4 L/day] after an open AAA repair over 7 years ago whereby conservative measures failed over two months. In most cases, these symptoms tend to develop early on in the post operative period. Lipiodol and lymphangiography were utilized to control the lymph leakage with a good outcome.

Methods: We performed a literature review on the management of chylous ascites when conservative measures failed and lipiodol and lymphangiography were utilized. A series of case reports have been drawing much attention with the use of lipiodol. We monitored conservatively for 60 days with reluctance to consider surgical intervention that would involve preoperative localization and ligation of lymph channels in a gentleman not fit for surgery. We therefore utilized lipiodol once all conservative measures had failed.

Results: Lipiodol was infiltrated with lymphangiography showing a 50% decrease in output in the first week. A repeat CT scan showed inflammatory response sealing the lymphatic vessels. The daily amount of leakage continued to decrease over the fortnight being less than 200mL. Conservative measures were continued with a slow re introduction of a low fat diet and liquids.

Conclusions: In cases that are not responding to conservative measures and patients not fit for surgery, the use of lymphangiography and lipiodol is an alternative effective measure for management of chylous ascites. It has the added benefit of being diagnostic and therapeutic that are refractory to conservative approaches thereby avoiding open surgical intervention. Continued research and larger studies would be needed to obtain further conclusive assessment of its effectiveness and timely intervention.

Incidental isolated inferior vena cava aneurysm: case report and literature review
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Background: Inferior vena cava (IVC) aneurysm is a rare venous abnormality with potential clinical importance. IVC aneurysm could preserve potential morbidity and mortality and its diagnosis and management is of clinical interest. IVC aneurysm is classified into four types based on its anatomical location along the IVC. We present a rare case of incidental IVC aneurysm which was diagnosed and managed successfully. We report a rare case of IVC aneurysm in a 22-year old Afghan-Iranian...
male patient. The patient had a history of blunt abdominal trauma one week prior to his referral to the emergency department of our center. On his initial abdominal trauma, a complete physical examination and focused assessment with sonography for trauma (FAST) was done and the patient was discharged from the emergency department. The patient had vague abdominal pain after his discharge. We planned an abdominopelvic computed tomography (CT) scan with oral and IV contrast. The scan illustrated an IVC saccular aneurysm originating from right side of the IVC below the renal veins. We assumed that the aneurysm was found incidentally and was not relevant to the patient’s recent history of abdominal trauma. Magnetic resonance venography was also conducted and it also confirmed the diagnosis of a saccular type 3 IVC aneurysm.

We planned open resection and repair of the aneurysm. A midline laparotomy was done and right medial visceral rotation was conducted. A partial Satinsky clamp was applied below the site of aneurysm origin on IVC and a longitudinal incision was done on the aneurysm. Then, the entire aneurysm was resected and its origin was closed with running 6.0 polypropylene sutures. The patient had well recovery after the operation and his follow-up did not reveal any morbidity.

**Conclusions:** IVC aneurysm is a rare clinical entity. Its diagnosis necessitates precise clinic suspicion and the management is based on anatomical presentation and associated anomalies. We discuss potential diagnostic challenges of IVC aneurysms together with its management options during this article.
Vibration reduced the force required to overcome the needle’s 2 external performance-limiting factors: 1) Penetration Resistance by 57%; 2) Tissue Stiction by 36%.

Background: Sclerotherapy demands a high and sustained level of hypodermic skill. It is inherently a painful procedure. The hypodermic is used conventionally in a “high performance” hypodermic. This mosquito-inspired hypodermic can now deliver the very high level of precision that is essential for sclerotherapy, and with significantly less pain.

Role of oxidative stress in acute and chronic wound

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Background: Healing of wounds can be affected by many factors such as local circulation, hypoxia, infection, nutritional conditions, immunosuppression or metabolic dysregulation with special regard to diabetes. Redox dysregulation is a common feature of many skin diseases with overproduction of reactive oxygen and nitrogen species demonstrated by virtually all cell types in the skin. We set out to characterize the redox environment in wound fluids and sera from patients suffering from venous leg ulcers (N.=16) and acute wounds (bulla fluids from second degree burns; N.=11) and diabetic ulcers (N.=3). Serum samples were also obtained from healthy volunteers (N.=7).

Methods: Oxidative homeostasis was assessed by measuring the footprints of ROS/RNS (protein carbonyls, lipid peroxidation, protein tyrosine nitration) as well as radical scavenging activity and glutathione levels. Nitrating agents and the DNA damage signal molecule poly(ADP-ribose) was detected in tissue sections.

Results: Radical scavenging activity and glutathione contents were elevated in both chronic and diabetic wound fluids as compared to acute wounds. Moreover, significantly elevated concentrations of TNFalpha, interleukine-8 and vascular endothelial growth factor were found in chronic wounds compared to acute ones while lactate dehydrogenase levels (measure of cell damage) were not different. Correlation analysis revealed significant correlation between lipid peroxidation and protein carbonylation (in sera of chronic wound patients) and radical scaveng-
ing activity and glutathione content (in wound fluids of chronic wound patients). As for the sera from acute wounds, correlation was significant between lipid peroxidation and glutathione levels and negative correlation was found between tyrosine nitration and radical scavenging activity.

**Conclusions:** Our data identify multiple signs of redox dysregulation in both acute and chronic wounds with notable differences. In chronic wounds elevations of antioxidant levels/activities may indicate compensatory mechanisms while correlation analysis revealed parallel changes or causal relationships between parameters.

Support: GINOP-2.3.2-15-2016-00020 TUMORDNS,GINOP-2.3.2-15-2016-00048-STAYALIVE, OTKA K112336

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**The surgical correction of venous trophic ulcers of lower limbs**

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*Samara State Medical University, Samara, Russian Federation*

**Background:** To study the effectiveness of shave therapy and endoscopic fasciotomy in the complex treatment of patients with persistent refractory venous trophic ulcers and chronic venous compartment syndrome.

**Methods:** 105 patients of the C6 class were examined and combined. The average age is 62.4±7.1 years. Women predominated - 67 (63.8%). The duration of trophic ulcers is 6.7±1.6 years. A phlebectomy (crosssection, short stripping on the thigh) was performed (N.=105). In group I of patients (N.=35) free autodermoplasty of trophic ulcers was performed with a split perforated flap. Patients of Group I (N.=36) before autologermoplasty performed layered dermatolyptomy. Group II patients (N.=34) underwent SEPS in combination with fasciotomy, shave therapy and autodermoplasty. The evaluation of the long-term results of treatment was carried out within a period of 1 to 12 months.

**Results:** The time of complete epithelialization of ulcers in I was 49.4±7.2 days, in group II 31.4±4.7 days, in group III 32.1±3.6 days. In 7 patients (19.4%) patients of the I group, complete engraftment of the autodermotransplant, in group II in 27 (77.1%), in group III (in 27 (79.4%) patients. In group I partial necrosis (67.1±10.5 cm²) of the graft in 29 (80.6%), in 3 (8.3%) the absence of complete epithelialization.

**Conclusions:** Layered dermatolipectomy with autodermoplasty with a perforated flap and surgical correction of venous hemodynamic disorders is an effective method of treatment of persistent refractory venous trophic ulcers of the lower extremities.
CASES AND CLINICAL PUZZLES

The successful case of using CT-angiography in patient with occlusion of the femoral vein and incompetent great saphenous vein
Denis Borsuk, Alexey Fokin
South Ural Medical University, Chelyabinsk, Russian Federation

Background: Patient N came to the clinic with lower limb ulcers on the lateral and medial ankle. Ultrasound showed us pathological reflux in the popliteal vein (about 6 seconds) and in the great saphenous vein from preterminal valve (about 3,5 seconds). The imagiation of the femoral vein was rather difficult. That is why, we did CT-angiography of the leg veins with injection of the contrast solution from the veins of the foot (according to J.F. Uhl method).

The CT-angiography perfectly showed us occlusion of the femoral vein and just only 2 functional little branches of the deep veins. Great saphenous vein was a strong way of the outflow. That is why we preferred keeping it. Conservative treatment was successful and the ulcers were healed.

Conclusions: CT-angiography of the leg veins with injection of the contrast solution from the veins of the foot (according to J.F. Uhl) can be effective investigation method in patients with lower extremities veins pathology.

Restricted usefulness of lymphoscintigraphy in follow-up of primary lymphoedema
Rita Hansdorfer-Korzon
Medical University of Gdańsk NIP 584-09-55-985, Gdańsk, Poland

Background: Treatment of primary lymphoedema is very problematic. We present a case of 46 years old woman with lately diagnosed primary lymphoedema. After diagnosis she was treated intensively physically and medicinally. Concurrently performed lymphoscintigraphic follow-up demonstrated no evolution of disease. The diagnosis of primary lymphoedema and initiation of appropriate treatment is usually greatly delayed. In spite of continuous progress in diagnostic and therapeutic methods, we do not observe any improvement in frequency of taking primary lymphoedema into account in diagnostics. To identify the cause of edema, various imaging methods can be used. We also emphasize the role of LS as a gold standard in diagnostics of primary lymphoedema and its limited unsuitability for follow-up assessment.

Key words: lymphoedema, primary congenital lymphoedema, rehabilitation, lymphoscintigraphy

Conclusions: For many years it has been known that LS is a gold standard in imaging and differentiation of various causes of oedema. In our patient LS images were typical for primary lymphoedema and did not cause any diagnostic problems for the radiologist, LS was performed several times, at the beginning and during the therapy, but gave nearly identical results. In spite of the lack of scintigraphic improvement in the course of intensive therapy, metric measurements of affected limb were significantly reduced, the patients subjectively felt much better, limb mobility/functionality was improved considerably, and the swollen tissues were much softer. Possible cause of contrast between scintigraphic and clinical improvement is not fully clear and should be a subject of further studies and seems that an absence of lymphoscintigraphic regression of disease should not be an only indication to stop or modify physical therapy also in such advanced cases.

A perfect before and after: guess which treatment was performed?
Kasuo Miyake
Centro de Estudos Hiroshi Miyake, São Paulo, Brazil

Background: A female patient complaining about varicose veins at the groin. A treatment was proposed. Guess what type of treatment was performed:
1) Phlebectomy
2) Foam
3) CLaCS
4) Sclerotherapy
5) None

Conclusions: No treatment was performed! The before photo is during the third trimester of pregnancy and the after photo is after the baby was born! In this case, the aesthetic lesions practically disappeared 100%.

Resilient telangiectasis: diagnosis of feeder veins by phlebography in 1972
Kasuo Miyake, Hiroshi Miyake
Centro de Estudos Hiroshi Miyake, São Paulo, Brazil

Background: Patient complaining about one area lacking result after sclerotherapy. Because all other areas responded to sclerotherapy, and by 1972 there was no ultrasound or augmented reality, patient was submitted to a mini phlebography. Contrast was injected first in the telangiectasias and afterwards in the deep venous system. A phlebography was performed in each situation.

A pair of refluxing perforant veins connected to the group of telangiectasias were detected. Those feeding veins and perforant veins were removed/ligated respectively.

Conclusions: After the procedure, the desired outcome was achieved and the remaining telangiectasias responded to sclerotherapy. This is probably one of the first ever evidences of the relation of telangiectasias and feeding veins.

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CHALLENGES AND OPPORTUNITIES
FACING THE SPECIALTY

Venous operation most optimal pricing approach
Ashkan Haghshenas
Burjeel Hospital for advanced surgery, Dubai, United Arab Emirates

Background: Every country has its own method of payment structure; 1. Government; 2. Insurance; 3. Cash; 4. Combination. Physician or medical facility are interested in highest financial income, payers are interested in the least. To assure a high-quality treatment with minimal recurrence. Requirements:
1) Complex operative technique,
   a) one or multiple veins laser treatment
   b) number of phlebectomy
   c) foam sclerotherapy
2) post-operative investigations
   a) Ultrasounds
   b) Photo-plethysmography
3) Wound care

4) Touch up
   a) Hematoma aspiration
   b) Foam sclerotherapy

Challenges: 1) Regular investigation and control of remaining veins at early stage assure against operation failure, residuals or complication (thrombosis) treatment.
2) Unlimited examination and multiple post-operative treatment increases the overhead cost and causes non-prognosis final procedure cost.
3) Obtaining insurance approval for every step is costly and time-consuming, eventually deteriorating quality of care by late responses.

Our proposed approach is packages. Package calculation and formatting.
It consists of 2 segments
1) Variable
   a) Number of treated vein by laser in one extremity
   b) Number of estimated phlebectomy (more or less than 20 incision)
   c) OT time
2) Fixed
   a) Post-operative ultrasound minimum of 3
   b) Wound dressing minimum of 2
   c) Clinical visit 3 (to avoid miss abuse extra visits are chargeable)

Prices are fixed per segments and simply add.

Conclusions: Payer guarantees a fixed amount per case no matter the outcome. Medical facility assures Hassle free fixed income no matter of patient follow-up, single approval, no discount nor complains.
COMPRESSION

Usefulness of low compression corsets in prevention of lymphoedema in patients after axillary lymphadenectomy
Rita Hansdorfer-Korzon
Medical University of Gdańsk NIP 584-09-55-985, Gdansk, Poland

Background: There is no fully effective treatment for secondary lymphedema. It typically occurs in a limb, but it can also occur in the torso, especially in breast cancer patients. The currently used compression therapy has varying efficiency, especially for primary prevention. The aim of the study is to find a response to 1. compression therapy with Class 1 compression garment can prevent truncal lymphedema on the operated side.

2. the use of compression garments is purposeful and efficient in prevention and treatment of truncal lymphedema after mastectomy and additional radiotherapy.

3. the use of compression garments in reduction of pain

Methods: The study group was randomly divided into two subgroups: subgroup G (received compression corsets) and subgroup K (control) no physiotherapeutic treatment. The size of truncal lymphedema was measured using ultrasound. The patients were examined four times. The follow-up was for 7 months in total. The results were statistically analyzed. Also in both subgroups, we analyzed the reduction of pain.

Results: In both subgroups (G and K) the nonparametric Friedman ANOVA test was carried out. The ultrasonography test, performed after mastectomy with axillary lymphadenectomy, showed the occurrence of edema in all the patients of both subgroups. Additionally, some selected patients in each subgroup were undergoing radiotherapy throughout the observation. The obtained results, have confirmed the positive effects of the compression garment therapy also during the radiotherapy. As many as 60% of patients wearing the compression garment showed reduction of pain in the chest and the shoulder joint on the operated side.

Conclusions: Class I compression corsets are an effective treatment for lymphedema, could be used for antiedematous prevention in patients who underwent removal of axillary lymph nodes and radiotherapy and also could reduce pain associated with surgical treatment of breast cancer.

Compartment pressure model of the mid-calf
John Marx1, Ashley Granot1, Ian Carlisle2, Ophelia Hirth1, Josef Goldbaum1
1Australasian College of Phlebology; 2Australian College of Plastic Surgeons, Melbourne, Australia

Background: To create a dynamic Compartment Pressure Model of the Mid-Calf.

Methods: 1. The Central Muscle Pressure is 20 mmHg. There is total of 20 mmHg incremental pressure increases, moving through the pressure interfaces, into the central muscle compartment; 2. Air Pressure is 760 mmHg. All Pressures are expressed as Absolute Pressures, where outer space is Zero, and then increasing through our atmosphere down to a sea level value of 760 mmHg; 3. Hydrostatic Pressure at the mid-calf is 80 mmHg, for a standing 1.80m tall man; 4. Blood Pressure: Relative Blood pressure is 120/80 mmHg. Hence the Central Arterial Pressure is a pulsatile 980/940. Laplace’s Law of pressure applies to all 4 of these compartments: \( P_{\text{Compartment}} = \frac{T}{R} \) all compartments exist in a dynamic state of Pressure Equilibrium with each other.

Results: The Pressure Model as illustrated satisfies all the above requirements.

Conclusions: This dynamic pressure model can explain the peripheral fluid shift that occurs in an airliner’s flight-induced tissue depressurization of 200 mmHg. In addition, this concentric arrangement of compartments within compartments, explains the central pressure amplification phenomenon that occurs when applying a 20 mmHg compression stocking.

Description: Hydrostatic Pressure 80mmHg, Air Pressure 760mmHg, Interface Pressure 20mmHg, and Blood Pressure 120/80mmHg, all exist in a dynamic state of Pressure Equilibrium with each other.

Angiojet ultra system therapy for DVT
Cheng Yu Yang
The Third Affiliated Hospital of Guangzhou Medical University, China

Background: To investigate the clinical outcome of the percutaneous mechanical thrombectomy (PMT) combined with catheter directed thrombolytic which was the new therapeutic pattern for the lower extremities deep venous thrombosis.

Methods: We collected 21 cases underwent PMT+CDT therapy and 31 cases underwent CDT alone therapy whose recovery different consequences were found out.

Results: 15 patients of the observation group obtained grade III lysis result and in the clinical estimated system, PMT+CDT group had 18 totally recovery, 1 partial recovery and 2 inefficacy. Meanwhile, 10 patients of the CDT alone group obtained grade III lysis. In the clinical estimated system, control group had 11 totally recovery, 5 acceptable recovery, 14 partial recovery and 1 inefficacy. The difference between these groups had statistical significance.

Conclusions: PMT+CDT group had better therapeutic outcomes, shorter thrombolysis time, less urokinase and shorter hospital stay.
An integrated social media approach for the phlebologist
Samuel Peek
Incredible Marketing, Irvine, United States

Background: An effective social media presence affords a venue for building and maintaining patient relationships, optimizing word of mouth exposure, profiling services and new technologies, generating disease awareness, and reinforcing brand identity. The purpose of this presentation is to demonstrate to the phlebologist how to build a successful and engaging social media campaign that connects with patients, builds a specialized community, and generates business.

Methods: To create an optimal social media presence, we evaluate a varied content mix, including blog, video, images, surveys, questions, articles, patient reviews; email and website; and timely, scheduled social media activity.

Results: A case study will be presented that demonstrates the impact of social media on the phlebologist’s practice. Professional service options will also be presented.

Conclusions: With nearly 2 billion active users on Facebook alone, and an equal number on YouTube, Instagram and Twitter combined, connecting with patients requires skills of engagement, including a varied content mix, email and Website integration, and a regular social media presence that employs a patient-friendly tone. A social media presence is a valuable differentiator, especially for specialized medical practices, and success requires a strategic, integrated approach.
DEEP VEINS

Long-term outcomes of stent placement for May-Thurner syndrome
Keunmyoung Park
Surgery, Inha University Hospital, Incheon, Republic of Korea

Background: We assess the clinical results of stent placement after treatment of deep vein thrombosis (DVT) in patients who previously underwent venous stenting for May-Thurner syndrome (MTS).
Methods: We reviewed the data of 128 patients with DVT caused by MTS who were treated with stent placement from January 2005 to May 2016. We evaluated to patency of iliac vein stent, venous clinical Severe score (VCSS) after contralateral occlusion during follow-up.
Results: Among 128 iliac vein stentings, male patients were 26 and mean age is 54.3 (Range: 19-85). During follow-up (mean 46 months, Range 1-133), 5 year patency rate of iliac vein stent is about 80%. There were 21 ipsilateral stent occlusions and 10 contralateral occlusions. There were 12 post-thrombotic syndromes over VCSS 5. Factors of ipsilateral and contralateral occlusion of iliac vein after stent are coagulopathy (CI: 1.254-5.535, P<0.001) and stent deployment into IVC(CI: 1.325-7.324, P<0.001)
Conclusions: Iliac vein stenting in MTS shows good long-term result. But, accurate deployment of iliac vein stent during procedure and regular follow-up in patients with coagulopathy are necessary

Association of hypothyroidism and chronic venous insufficiency: first approach to the problem
Pedro Lopez1, 2, Jorge Ulloa3, Jorge Ulloa-Dominguez2, Julian Arenas1, 2
1Universidad de los Andes; 2Fundacion Santa Fe Hospital, Bogota, Colombia

Background: The prevalence of Hypothyroidism in the general population is 2%. No studies have described the relationship between Chronic Venous Insufficiency (CVI) and Hypothyroidism. We wanted to evaluate if the adults that have CVI have a higher prevalence of Hypothyroidism as compared to the general population.
Methods: From September 2016 to March 2017, a cross-sectional study was conducted at the Fundacion Santa Fe de Bogota Hospital in Bogota, Colombia in an adult group of patients who went to vascular surgery consultation. The present study obtained 350 adults in whom the diagnosis of CVI was done; they were evaluated for the possibility of Hypothyroidism by their clinical history. Other variables evaluated were BMI, age, CEAP Classification and Hypertension.
Results: From the 350 patients, 258 (74%) were women. The mean age of the study was 47±2 years old. 58 patients (16.2%) in study had hypothyroidism. 50 adults (14.2%) of the population in the study had arterial hypertension.
Conclusions: The study shows a higher prevalence of Hypothyroidism in patients with CVI as compared to the general population. This study shows us the possibility of an association between CVI and Hypothyroidism. Future research taking into account TSH levels and Free T3 for all patients diagnosed with CVI, will help us elucidate a better understanding of this association.

Varicose vein surgery in deep vein aplasia and hypoplasia cases
Imre Bihari, Geza Tasnadi
A and B Clinic, Budapest, Hungary

Background: Possible devascularization procedures are classic surgical or new endovascular interventions. In some cases of venous truncular defects, removal of varicose veins even in the case of a hypoplastic deep venous system is possible (Belov I). In other cases step-by-step management should be advised in order to reroute the venous flow from the superficial enlarged vessels to the deep veins (Belov II).
Methods: In 12 cases hypoplasia, aplasia or stenosis were present in the deep axial veins. Signs of obvious AV shunts were not found in these cases. They were selected for surgery using a new modification of the Perthes test. Instead of a rubber strip tourniquet, a tensiometer cuff was placed on the limb just below or just above the knee. The cuff was inflated to 110 mmHg and the patients were asked to walk quickly for 5 minutes. In positive cases, when deep veins were absent and superficial veins were compressed by the cuff, the limb became livid and the patient complained of strong pain within 1 or 2 minutes. In negative cases, when collateral channels in the subfascial space were sufficient in number and diameter to drain the venous blood from the leg, patients informed us that their legs felt better.
Results: In these cases dilated pathologic superficial veins were removed without any circulatory complications.
Conclusions: Subfascial collaterals are able to maintain the venous drainage of the limb without the deep and superficial veins.
**DERMATOLOGY IN PHLEBOLOGY**

**Detergent sclerosants effect on basophils in vitro**

Pooja Kadam1, David Connor1, Kurosh Parsi2

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**Background:** STS (sodium tetradeyl sulphate) and POL (polidocanol) are widely used in the treatment of lower limb veins and telangiectatic matting. The precise effect of detergent sclerosants STS and POL on basophil cell activation and histamine release is unknown. We aimed to investigate the effect of detergent sclerosants on basophil activation and histamine release in vitro.

**Methods:** Basophil cell lines were incubated with varying concentrations (0.0375% - 0.6%) of detergent sclerosants STS and POL in vitro. Expression of basophil cell activation markers CD63 and CD203c were measured using flow cytometry. Histamine release was measured using enzyme-linked immunosorbent assay (ELISA).

**Results:** CD63 expression had a significant increase with STS at concentrations 0.15% and 0.3%. CD203c expression remained the same at all STS concentrations. POL had no effect on basophil cell activation at all concentrations. Histamine release was not found to be significant in the ELISA experiments.

**Conclusions:** CD63 and CD203c are markers of basophil cell activation. STS had a greater effect on basophil cell activation than POL. POL is a weaker sclerosing agent than STS in clinical settings. CD63 and CD203c expression in STS and POL concentration 0.6% was the lowest. This is largely due to increased cell lysis that high sclerosant concentrations induce. Both STS and POL had no significant effect on histamine release in vitro. We aim to use the results of the in vitro experiments to determine the distinctive effect of detergent sclerosants in clinical settings.

**Leg ulcer skin graft in outpatients**

Pierre Ouvry

Cabinet Medical, Dieppe, France

**Background:** Skin graft is one of the most effective treatments of leg ulcers. It is generally carried out during a short hospital stay. The aim of this study is to evaluate the tolerance and efficacy of skin grafts performed in an outpatient setting.

**Methods:** Between January 2016 and June 2017, 74 skin grafts were performed in 60 ambulatory patients. The main indications were either delayed healing or a very painful wound. The grafts were performed under local anaesthesia in a dedicated room by nurses graduated in wound and healing or in training.

**Results:** There was no complication of treatment. No bleeding or infection of the area of skin sampling. The grafts were performed under local anaesthesia in a dedicated room by nurses graduated in wound and healing or in training.

**Conclusions:** Even if patients are different from those requiring hospitalization, leg ulcer skin grafting is a well-tolerated treatment that must find its place in the treatment of this disabling pathology.
EXTRACRANIAL AND CEREBRAL VENOUS DISEASE

The prevalence of risk factors for venous stroke among the adult population of the city of Ulyanovsk, Russia

Dmitri Kornev
Ulyanovsk State University, Russia, Ulyanovsk, Russian Federation

Background: An actual problem of modern angioneurology is the development of effective preventive programs, aimed at reducing the prevalence of cerebrovascular diseases (CVD).

Methods: In the outpatient clinic of the city of Ulyanovsk, surveyed 318 (126 men and 192 women), ages 20-70 years. All examined patients were divided into 2 groups: group A – up to 40 years (114 persons(35.8%)); group B – over 40 (204 people(64.2%)). For results processing was used Microsoft Office Excel 2007 and STATISTICA 10. The significance of differences was assessed by Student’s criterion (P<0.05).

Results: The most common modifiable RF CVD was unbalanced meals - 66%, the increase of BMI - 50.3%, physical inactivity - 54.4% and a stress - 54.4%. In group B revealed sugar diabetes (SD) - 13.7%, coronary artery disease - 32.3%, the atrial fibrillation (AF) - 9.3%, in group A was not of these diseases. Non-modifiable FR such as constitutional venous insufficiency (CVI) was more common than a genetic predisposition to strokes: 44% and 24.5%, respectively, P<0.05.

Conclusions: In a population dominated by modifiable FR, CVI is widely distributed in the population, which confirms the importance of these diseases and need for early diagnosis and prevention. The obvious, need to intensify health education work among the population to improve primary prevention of CVD.

The relationship between venous insufficiency, the value of the left ventricular ejection fraction and repeated ischemic stroke in hypertensive patients

Liudmila Belova, Victor Mashin, Rinat Gimaev, Vladislav Lankov, Eugene Dudikov
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Background: The identification the of the risk of primary and repeated ischemic strokes (IS) depending on the condition of central and peripheral hemodynamics is a topical problem of medicine. The aim of the study is to evaluate the influence of venous constitutional insufficiency and the left ventricular ejection fraction (LVEF) on the development of repeated ischemic stroke in hypertensive patients.

Methods: 69 patients with IS and were examined. All the patients were divided into 2 groups: the first group was made up of 36 patients with LVEF >60% (N.=36)(16 women and 20 men; mean age 57.2(6)years); the second – patient with LVEF<60% (N.=33) (15 women and 16 men; mean age 56,3(7,3) years). The criteria of venous constitutional insufficiency were the patients’ complaints characteristic of this disorder type. Results: In the first group in 33.3%(N.=12) patients repeated IS was registered, and at the same time in the second group RR of repeated IS was observed in 63,6%(21). The relative risk of developing repeated IS in patients with ejection fraction LVEF<60% was 1.9 (CI 95% - 1.11; 3.27).

Conclusions: In patients with venous insufficiency and LVEF <60% the risk of recurrent development is statistically significantly higher (than in patients with LVEF >60%), which should be taken into account in the treatment and prognosis of this group of patients.

Relations between electrophysiological parameters of the heart and venous insufficiency in patients with ischemic stroke

Liudmila Belova, Karina Zakuraeva, Vladislav Lankov, Eugene Dudikov, Rinat Gimaev, Victor Mashin, Anna Solovyeva, Maxim Krestyaninov
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Background: Cardioneurologic relations are actual problem in modern medicine. Venous insufficiency plays significant role in prognosing of hair circulation disorders. The aim of our study was evaluation of relation between electrophysiological parameters of the heart and venous insufficiency in patients have ischemic stroke in the history.

Methods: 89 patients with ischemic stroke were examined. All patients were divided into 2 groups: 1st group patients with have venous insufficiency (N.=42) (22 male and 20 female); mean age 56.9(8.5) years; 2nd group – patients without venous insufficiency (N.=47) (24 male and 23 female); mean age 57.9(9.3) years. In all patient was executed ECG in standards 12 leads and high resolution ECG to determine corrected QT interval dispersion (QTcdn) and total QRS; RNS40; LAS40. Venous insufficiency criteria were specific symptoms, venous pathology in several localizations, disease of veins in the family.

Results: TotQRS was significant higher in patients from 1st group (156.6(48.3)) in comparison with patient 2nd group (132.7(27.1)) (P=0.022). Also, more values of QTcdn were patients with venous insufficiency - 40.8(15.2) and 23.7(11.4), P=0.038. We didn’t find statistical- ly significant differences in such parameters as RNS40, LAS40 between 1st and 2nd groups of patients.

Conclusions: Thus venous insufficiency presence is associates with significant higher values of TotQRS and QTcdn.
Making sclerosant foam: not all devices are the same
Richard Oliver
STD Pharmaceutical Products Ltd, Hereford, United Kingdom

Background: Some practitioners have difficulty with sclerosant foam reforming quickly into liquid before use in ultrasound guided foam sclerotherapy when using some brands of syringes. This is thought to be related to the silicone lubricant lining the syringes used by some manufacturers. The objective was to compare the sclerosant foam made using a range of commercially available syringes (2.5ml or 5ml) and connectors (3-way taps, straight connectors, designated foam making devices).

Methods: Liquid 3% sodium tetradecyl sulphate (STS) in one syringe was joined to a second syringe containing air via a Luer locked connector. The liquid:air ratio was 1:4 (1 part liquid to 4 parts air). The contents of the two syringes were mixed and passed between syringes twenty times. A full syringe of foam was immediately inverted and the time taken for liquid to reform was measured.

Results: As expected, silicone free syringes produced the most stable foam. Of the lubricated devices, some brands of syringe and connector combination produced significantly more stable foam than other combinations. There were some differences between 2.5ml and 5ml syringes of the same brand but this was not statistically significant.

Conclusions: When faced with STS foam reforming to liquid, using a syringe/connector combination that maximises the foam stability can be very helpful. This can be especially pertinent when direct injections are used and for the less experienced or trainee operator.

Soap bubbles, toils and troubles. 50-year evolution in the manufacture of sodium tetradecyl sulphate injection
Mike Watkins
STD Pharmaceutical Products Ltd, Hereford, United Kingdom

Background: A review of 50 years of manufacturing of Fibrovein. The journey from an industrial active to pharma grade from start to finish.

Methods: Review will cover how the regulatory requirements have changed over the last 50 years and the implication for manufacturing sclerosants.

Results: The process has changed significantly with major implications on the cost of manufacturing and maintaining product licenses.

Conclusions: Modern sclerosants are made to exacting pharmaceutical standards and are fit for purpose in the modern era.
GENETICS

Genetic polymorphism of the hemostatic system in young and middle-aged patients with ischemic stroke and constitutional venous insufficiency

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Background: Stroke holds a leading position among the priority problems of modern neurology due to its high prevalence, high mortality rate and the degree of disability in the population. Objectives is to analyze the contribution of genetic polymorphism of the hemostatic system in susceptibility to the development of ischemic stroke (IS) in young and middle-aged patients.

Methods: The work was done at the neurological department of the hospital. Genetic polymorphisms were determined using a kit of reagents for determining genetic polymorphisms “CardioGenetika Thrombophilia”. 172 patients in the acute period of IS at the age of 25 to 60 years were examined. Among the examinees were 69 women and 103 men. The average age of the surveyed 266 patients was 58 years. Polymorphisms in candidate genes described in the literature were selected for the study: polymorphism 20210G>A FII gene, 1691G>A FV gene, -455G>A gene FGB, -675 5G>4G gene PAI-1, 807C>T ITGA2 gene 1565T>C ITGB3 gene.

Results: Studied polymorphic variants of genes were detected in 81.4% of patients. Statistically significant differences of polymorphic variants of the following genes in patients with IS and symptoms of constitutional venous insufficiency compared to patients without symptoms was revealed: FGB gene (26.6% and 42.2%), gene FV (17.1% and 5.1%), FII gene (10.6% and 6.9%), PAI-1 gene (32.9% and 15.4%), P<0.05.

Conclusions: Genetic predisposition has a significant role in the development of ischemic stroke.

Monocyte chemoattractant protein-1 gene polymorphism rs1024611 influences the risk of primary varicose veins of lower extremities

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Background: Identification of genetic factors associated with the risk of primary varicose veins (PVVs) can be helpful in elucidating molecular mechanisms underlying PVVs formation. We performed a genome-wide association study (GWAS) on the sample of ethnic Russian individuals in order to reveal genetic loci affecting the risk of this pathology.

Methods: The discovery set included 212 patients with PVVs and 240 control individuals. Genotyping was performed using HumanExome-12 v1.0 BeadChip (Illumina, USA) querying common and rare genetic markers. After the quality control procedure and exclusion of monomorphic and rare variants, 25 424 common single nucleotide polymorphisms (SNPs) we left for the analysis. Top 50 SNPs most significantly associated with PVVs were selected for further replication in the independent sample of 447 PVVs patients and 443 controls.

Results: The combined analysis of discovery and replication stages revealed a suggestive susceptibility locus in the complement factor B gene region associated with the risk of primary varicose veins of lower extremities.

Conclusions: Identification of association signal in the complement factor B gene region (rs4151657) associated with PVVs with P=3.4*10^-5. This gene is located on chromosome 6 within the major histocompatibility complex class III region, which includes several genes involved in regulation of the immune reaction and inflammatory response. Since the association did not reach the Bonferroni-corrected level of P=2*10^-8, independent validation of our results by other research groups would be beneficial.

Genome-wide association study identifies a suggestive locus in the complement factor B gene region associated with the risk of primary varicose veins of lower extremities

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INTERVENTIONAL RADIOLOGY

Ultrasound assisted catheter directed thrombolysis for sub-massive pulmonary embolism
John Manov, Prasoon Mohan, Francisco Contreras, Michael Langston
1University of Miami Miller School of Medicine, Miami, United States; 2Interventional Radiology; 3Radiology, University of Miami Miller School of Medicine, Miami, United States

Background: Catheter Directed Thrombolysis is a relatively new therapy for pulmonary embolism that achieves the superior clot resolution compared to systemic thrombolysis while avoiding the high bleeding risk intrinsically associated with that therapy. In order to examine the efficacy and safety of catheter directed thrombolysis (CDT), we conducted a retrospective cohort study of patients undergoing ultrasound assisted CDT at our institution.

Methods: The charts of 30 consecutive patients who underwent CDT as treatment for pulmonary embolism at our institution were reviewed. Risk factors for bleeding during thrombolysis were noted. Indicators of right heart strain on computed tomography and echocardiogram, as well as degree of pulmonary vascular obstruction, were recorded before and after CDT. Thirty-day mortality and occurrence of bleeding events were recorded.

Results: Nine (30%) patients had three or more minor contraindications to thrombolysis and fourteen (47%) had had major surgery in the month prior to CDT. Right ventricular systolic pressure and vascular obstruction decreased significantly after CDT. There was a significant decrease in the proportion of patients with right ventricular dilation or hypokinesis. Decrease in pulmonary vascular obstruction was associated with nadir of fibrinogen level. No patients experienced major or moderate bleeding attributed to CDT.

Conclusions: CDT is an effective therapy in rapidly alleviating the right heart strain that is associated with increased mortality and long term morbidity in patients with pulmonary embolism with minimal bleeding risk. CDT is a safe alternative to systemic thrombolysis in patients with risk factors for bleeding such as prior surgery. Future studies should examine the safety of CDT in patients with contraindications to systemic thrombolysis.

Transradial approach for hemodialysis access intervention
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Background: Perianastomotic stenosis is a common scenario after creation of arteriovenous fistula for hemodialysis. Many of the interventionist prefer transvenous approach. But transradial approach can easily visualize radial artery and cephalic venous tree up to central vein.

Methods: This is a retrospective study performed between November 2012 to January 2017 in Ibn Sina Hospital, Dhaka, Bangladesh. Ethical permission was taken from institutional ethical committee. Total number of patients undergoing hemodialysis access was 148 (male 74, female 74, male-female ratio 1:1). Number of radiocephalic fistula was 95 (64%), brachiocephalic fistula 50 (34%) & others 3 (2%). Most of the punctures were done by palpation. Sometimes puncture was made by Ultrasound guidance. Puncture needle size was 21 gauge, 4cm or 2.5cm long needle. Sheath size was 6 F x 4 cm or 7 F x 4cm.

Results: We approached 140 (97%) cases successfully through retrograde transradial approach. 8 (3%) cases were approached through retrograde venous approach because of thrombosis of radial artery due to previous intervention or creation of radiocephalic fistula in an end to end fashion.

Conclusions: Retrograde radial arterial approach to dilate perianastomotic stenosis as well as outflow vein is a good option.
**LEG ULCERS AND WOUND CARE**

Mid-and-long term results of subfascial endoscopic perforator surgery in Japan

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1Matsusaka Ohba Clinic, Matsusaka; 2Takamatsu Central Hospital, Hiroshima; 3Fukuoka City Hospital, Fukuoka; 4Kawasaki Medical School, Karusaki; 5Mitsubishi Miwa Hospital, Miwa; 6Sendai Hospital of East Japan Railway Company, Sendai, Japan

**Background:** To clarify the clinical results of subfascial endoscopic perforator surgery (SEPS) supported by Japanese national insurance after April 2014, which has been performed in the 21st century in Japan.

**Methods:** This study included 1287 limbs of 1091 patients who underwent SEPS in 14 facilities. In each limb, the venous clinical severity score (VCSS) was calculated before and 6 to 12 months after surgery. The ulcer healing rate and ulcer recurrence rate were calculated cumulatively. The clinical status of each limb was divided into 351 C6s, 72 C5s, 358 C4bs, 201 C4as, 40 C3s, and 265 C2s. Simultaneous saphenous vein treatment was performed in 1079 limbs (83.6%), and 118 limbs (9.2%) had deep venous lesions.

**Results:** Preoperative VCSS was significantly decreased from 10.0±6.6 to 3.1±3.4 (P<.0001) postoperatively, it was similarly decreased from 17.4±5.3 to 5.5±4.1 (P<.0001) in C6 limbs and from 11.8±6.4 to 4.7±4.4 (P<.0001) in limbs without simultaneous saphenous vein ablation. The primary ulcer healing rate was 96.2% (332/345 C6 limbs), and the ulcer recurrence rate was 12.0% (49/393 C5, C6 limbs) at the average follow-up period of 46.0 months after the ulcer healed. Recurrent ulcers were followed-up in 38 limbs, and secondary ulcer healing was obtained in 20 limbs (52.6%).

**Conclusions:** SEPS is an important new alternative within the Japanese medical system for treating incompetent perforating veins in patients with severe skin lesion.

Metabolic profiling reveals changes in serum, urine and ulcer fluid of patients with chronic venous ulceration

Richmond T. Bergner, Sarah Onida, Rahul Velinesi, Konstantina Spagou, Manjit S. Gohel, Joseph Shalhoub, Elaine Holmes, Alan H. Davies

**Imperial College London, London, United Kingdom**

**Background:** Chronic venous ulceration (CVU) is a condition contributing to significant physical, social and psychological morbidity in patients, representing 2% of the national healthcare budget expenditure in England (over £600 million per annum). Compression therapy is the main treatment in CVU, but can be painful, time consuming and presents significant recurrence rates. The identification of a single, reliable biological marker with the ability to identify non-healing ulcers has important translational applications for disease prognostication and development of therapeutic targets. The aim of this study was to identify potential biomarkers predictive of healing or failure to heal in a CVU population.

**Methods:** 28 patients with CVU were recruited with sequential follow-up over a twenty-week period. Untargeted metabolic profiling was performed on urine, serum and ulcer fluid samples, using liquid chromatography mass spectrometry (LC-MS) and nuclear magnetic resonance (NMR) spectroscopy.

**Results:** Following multivariate and univariate analysis, a differential metabolic phenotype was identified in healing compared to non-healing CVU patients. Statistically significant metabolites responsible for defining the metabolic phenotype were extracted. Subsequent metabolic pathway analysis of the assigned metabolites revealed phospholipid metabolism, sphingolipid metabolism and energy metabolism to be relevant biological pathways. Most notably, urine, serum and ulcer fluid were all adequate biofluid sources to differentiate between healing and non-healing CVU patients.

**Conclusions:** In summary, significantly altered metabolites and pathways were identified in serum, urine and ulcer fluid of patients with CVU, with the ability of differentiating between a “healing” and “non-healing” phenotype. This has important translational applications with respect to prognostication and development of targeted therapies.

Early ablation of reflux in patients with ulcus cruris venosum

Simon Julínek, David Klein

**Surgery, One Day Surgery Clinic Palas Athena, Prague, Czech Republic**

**Background:** The authors in presentation point out early surgical approach in patients with ulcus cruris venosum caused by insufficient superficial venous system. Unfortunately, in many patients with ulcus cruris venosum the ablation of venous reflux is recommended very late. It is accompanied worse quality of life and increase cost of health service.

**Methods:** Retrospective analysis of operated patients with ulcus cruris venosum in Palas Athena. First of all we analysed the time from diagnosis to surgical intervention.

**Results:** From 2010 to 2015 we performed 105 intervention in insufficient superficial venous system in patients with ulcus cruris. At the beginning we did only high ligation without stripping (16x), later we performed endovenous laser ablation (89) of stem veins with 1470 nm diode laser fy Biolitec. Endovenous laser ablation were performed 89, high ligation of saphenous veins 16. The average time from diagnosis to operation were 37 months. We noticed 2 months as the shortest time and 123 months the furthest time from diagnosis to operation. A total of 105 patients only 13 patients had ulcus cruris less than 1 year. We did not record any complications such as infection of incision, deep vein thrombosis and pulmonary embolism.

**Conclusions:** We found out, that there is a long time from diagnosis ulcus cruris to ablation of venous reflux. The average time was 37 months. The surgical treatment of superficial venous system must be the basic part of health care in patients with ulcus cruris venosum. The methods of choice are endovenous heating methods.

The zinc-coumarine bandage in venous leg ulcers. 15 years experience

Roberto Almeida Chetti, Eduardo Tkach

**Clinica de Varices Computarizada, Buenos Aires, Argentina**

**Background:** To demonstrate the efficacy of the zinc-coumarin dressing use in venous leg ulcers. 15 years experience.

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**Background:** To demonstrate the efficacy of the zinc-coumarin dressing use in venous leg ulcers. 15 years experience.
Peripheral neuropathic pain (PNpP) in venous ulcers (VU)
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Surgery Phlebology and Lymphology Service, Colon Clinic, Mar del Plata, Argentina

Background: PNpP is chronic pain, has multiple etiology but there is not firm evidence of its association with VU.
Objectives: 1) Primary: develop a diagnosis protocol of PNpP in VU and determine its prevalence; 2) Secondary: determine the utility: VAS, DN4, EQ5D5L and BPI.
Methods: Cohort, prospective, consecutive non-random. Population: 75 pts leg ulcers, sample: 68 VU.
Period: 24 months
Protocolization: diagnosis, local treatment and CT in VU diagnostic of PNpP in VU.
Results: G1: 20pts 29.42%
G2: 48pts 70.58%
VAS: intensity G1: 6.2 / G2: 8.7 SS
Average duration: G1: 3.19 / G2: 6.04 months SS
Prevalence of female sex in both groups
Average age: G1: 70.6 / G2: 58.6 SS
EQ5D5L mean score: G1: 2 / G2: 6.8 SS
Precision of the items: tingling and burning pain are the most reliable symptoms

Follow your comparing my endovenous techniques of curing venous ulcers
István Rozsos, Gergely Vadász
Theta Center Pécs, Pécs, Hungary

Background: The correction of the venous system in case of persistent nonhealing ulcer is necessary - in any possible ways. On the one hand, the endovenous thermo-ablation interventions mean a lower stress, but they are more expensive operations. On the other hand, the method of Foam sclerotherapy proved to the a good intermediate solution as it is both efficient and cost effective.

Methods: For patients with increased risk who suffered chronic venous ulcer or pre-ulcer we used FOAM-treatment and endovenous Laser or RF ablation as an alternative to the classical surgical solution. In the first group - 11 cases were foam treated, were treated targeting the healing of the ulcer. In the second group 11 patients were foam treated, the goal was to prevent the ulcer.
In the third group - we used the endovenous thermo-ablation (6 laser/5 RF) in 11 cases again - to heal ulcer.
In the fourth group we used the 5 laser and 6 RF endovenous therapy for the prevention of ulcer.
We recorded the condition of the wound with photo documentation, venous-screening and Duplex examination.

**Results:** Following a 3 year follow-up period we can establish that all of the first 11 patients are free of ulcer – wounds healed. Two patients needed the foam treatment repeated after 1 year, and in one case endovenous laser ablation was needed again after two years. The second group shows the same results after two years – 11 patients without ulcer. The third and the fourth group after 2 years shows very good venous status without ulcer.

**Conclusions:** In our practice, even in the cases where otherwise surgery would have been required, we opted for foam treatment – these cases were elderly patients or patients with diabetes or cardio-pulmonic deficiency. This technique is easy to carry out – the improvement of circulation and wound healing is significant with minimum stress, and it is also cheaper than the endovascular ablation.

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**The role of supervise exercise training that adjunctive to compression therapy in patients with chronic venous ulcer: preliminary result**

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**Background:** Venous leg ulcer is common among people in Thailand and deterioration of this disease can be costly and affect quality of life. The aim of this study was to elucidate the efficacy of calf muscle exercise adjunct with standard compression therapy.

**Methods:** A randomized controlled trial study has been conducted since March 2017 onwards at Maharaj Nakorn Chiang Mai hospital, Thailand. Outpatients with chronic venous leg ulcer were randomized to exercise group (supervised exercise and compression therapy) or non-exercise group (compression therapy alone). Wound parameters, ankle and calf muscle physical parameters, and functional ability were assessed before, during, and after the 12-week-exercise program. This study was approved by our local Ethic committee.

**Results:** Twelve outpatients aged ≥25 years completed the baseline measurements (exercise: N.=6; non-exercise: N.=6). Body mass index was higher in exercise group than non-exercise group (30.33±3.64 vs. 21.97±4.26 kg/m², P=0.005). There were no significant difference of the wound parameters, including wound maximum depth (0.09±0.12 vs. 0.34±0.32 cm), area (4.01±4.76 vs. 17.52±19.78 cm²) and volume (0.47±0.94 vs. 6.14±8.46 cm³). No significant difference observed in the physical assessments, including degree ankle range of motion (dorsiflexion = 7.50±5.97 vs. 8.00±5.29; plantar flexion = 30.40±6.54 vs. 29.50±18.98), ankle circumference (37.80±4.66 vs. 29.25±5.87 cm), calf muscle strength (142.29±82.48 vs. 133.73±87.03 N), calf muscle endurance (6.40±4.39 vs. 3.50±7.00 times), and shuttle walking test (166.80±52.43 vs. 163.88±31.31 m).

**Conclusions:** Our preliminary investigation at baseline showed no significant difference of wound parameters, physical parameters, and functional ability. During UIP 2018 conference, the result in primary outcome (wound healing) will be discussed further.
LYMPHATIC

Do anthropometric data help to distinguish between lipoedema and adipositas?
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Background: Lipoedema is a chronic progressive disease in women of unknown cause with abnormal depositions of subcutaneous fat, leading to symmetrical disproportional enlargement of the legs, hips and sometimes of the arms. The diagnosis is made on clinical evidence of only some hard criteria, but as we know, some criteria cannot be objectified, such as pain. So there still remain doubts, in particular in cases of a mixed disease, when lipoedema is combined with adipositas, or in cases where adipose individuals pretend to suffer from lipoedema despite lacking typical signs.

Methods: A pilot-study was initiated with 42 patients reporting the typical signs and symptoms of lipoedema. In all patients a physical examination was performed including measurement of weight, height and diverse circumferences. These data were compared with measurements from matched adipose patients without lipoedema.

Results: The BMI was not likely to differ between lipoedema and adipositas. In accordance to some cardiovascular studies the cut off-value between "purely" lipoedema and relevant adipositas was arbitrarily set by a waist circumference <88 cm. 76.2% of the patients (N.=32) showed a mixture of lipoedema symptoms and combined adipositas. All of them showed a waist-height-ratio >0.55 in contrast to the lipoedema group with consistently <0.55. All adipose women had quotients >0.6. As a new quotient the underbreast-hip-ratio was created and could separate significantly between adipositas and lipoedema.

Conclusions: The waist-height-ratio, underbreast-hip-ratio and the waist circumference seem to be suitable to demask lipoedema patients from adipose ones in combination with the known lipoedema criteria, in particular during the course of dietary and sports activities in mixed population. Further studies will be needed to confirm the data.
NEW TECHNOLOGIES

Web enabled application for measurement of wound size
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1INSOFE, Hyderabad; 2Surgery, Sanwari Bai Surgical Center, New Delhi, India

Background: Measurements are key to wound management, especially for long term problems like ulcers. We hereby describe a method for measurement of ulcer size which provides consistent and comparable documentation irrespective of provider, lighting as well as device. The application features and usage methodologies have been designed to be suitable for standalone, team-sharing and tele-monitoring scenarios.

Methods: Our technique involves the following broad steps: (a) User takes image of the wound region, with a known scale placed in background; (b) The scale and wound are extracted from the image. Drawing of the wound boundary is done using Artificial Intelligence and Machine modeling tools, which minimize inter-user variability; (c) The number of pixels corresponding to this marked region are used to determine the wound area in square-mm. Our demonstration will show an example work-flow of segmentation and measurement using web-enabled tools.

Results: Tests conducted so far show that the method can extract wound boundaries and compute wound size with minimal user input.

Conclusions: We will be making this work available through an online web application accessible through any mobile device. Future enhancements include automatic focus correction of the image and fully automatic segmentation of the wound area. Our long term goal is to create an open source toolkit around wound size estimation.

Radial fiber carbonization and damage after endovenous 1470nm and 970nm laser treatment
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Background: The endovenous laser treatment (EVLT) using the radial fiber and wavelength of 970nm in comparison to 1470nm lasers has not been studied enough. This combination is important for phlebologists, who continue to use 970nm lasers.

Methods: We used a radial fiber, 970nm and 1470nm lasers “Milon” (Russia), an automatic retractor of the fiber, and tumescent anesthesia. Inclusion criteria were: CEAP class C2, the vein diameter was 5-10 mm in the middle third of the thigh and target segment length 15-20cm. Ten EVLT procedures were performed per each mode: 1470nm+5.6W+0.7mm/sec; 970nm+5.6W+0.7mm/sec. The groups did not differ significantly in the duration of the fiber exposure. The radiation power measuring at the end of fibers of both types was performed before and after EVLT.

Results: To achieve 90% statistical power with a type I error of 5%, the required sample size comprised 9 measurements per group. Ten EVLA procedures were performed per each mode (1 and 2). The mean value (median) of the power loss after EVLT was 0.6W for 1470nm laser and 3.15W for 970nm laser (U=9.0, Z=3.06, P=0.002, Mann-Whitney U-test). The occlusion rate after 1-year follow-up was 100%. Microphotographies showed a marked damage of the bulb at the radial fiber tip after using the 970nm laser and absence of its damage after using the 1470 nm laser.

Conclusions: Radial fiber using with 970nm laser leads to the carbonization and microfractures of the glass bulb and significant radiation power loss after single EVLT procedure compared to the 1470nm wavelength. We didn’t get any differences in the occlusion rate and no fiber was broken during the procedure. However, the loss of energy is a reason not to recommend this mode for obliteration for extensive, long or several veins.

Details and difficulties of radio frequency ablation on varicose vein in lower extremity
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Background: Radio frequency ablation is one of the mini-invasive techniques to treat varicose vein in low extremity. But there are still several details and difficulties of such procedure.

Background: 1) Puncture of GSW under guide of ultrasound is the most important process in radio frequency ablation. Spasm of GSW will lead difficulty to puncture. Methods to prevent spasm of GSW are belows: Make the waiting time of patient to operation after entering operation room as shorter as possible; Pay more attention on local anesthesia on puncture site, which includes preventing too much anesthesia solution on the wall of vein and applying tiny needle to perform anesthesia (32F). Temperature affect on the spasm of vein: maintain room temperature to about 25 centigrade and pre-warm the sterilizing solution. Trendelenburg position is capable to facilitate puncture. 2) Tumescent anesthesia is the second vital process to radio frequency. Use of pump will facilitate the process. But fast injection will cause pain. We can adjust the position of injection needle around GSW to guarantee 360°tumescent. By one time of puncture, the tumescent solution can defuse to about 10 cms long approximately in about 1 min that means it is unnecessary to puncture too much times. How to evaluate the effect of tumescent? Decreased diameter of GSW with fully surrounding solution and temperature detected by radio probe decreases from 37 to 25 centigrade.

Conclusions: Appropriate attention on details and difficulties will make radio frequency more effective and successful.
NURSING

A patient friendly method of peripheral venous canulation

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Background: Peripheral venous canulation is a very common procedure performed in clinical practice. Occlusion of venous drainage proximally facilitates canulation by making the superficial veins prominent. Pressure induced discomfort and other Tourniquet related complications are drawbacks of this maneuver. The objective of this study was to compare hand compression and band tourniquet as the method of superficial venous occlusion prior to canulation.

Methods: 62 patients who need intravenous antibiotics for more than 3 days for acute infective pathologies in lower limb were included in the study. Degree of pain during canulation was documented in a pain scale ranging from 0 to 10. Initial canulation and subsequent canulation after three days were done alternatively on right and left hands using hand compression or band tourniquet. Equal number of patients had initial canulation in right hand followed my second canulation in left hand and initial canulation in lest hand followed by second canulation in rights hand. Equal number of patients had initial canulation with hand compression followed buy second canulation using bad tourniquet and initial canulation using band tourniquet followed by second canulation with hand compression.

Results: 28 males and 34 females had cellulitis, infected wound and abscesses. They had no obvious difference of sensory perception in right and left hands.

Hand compression and band tourniquet were preferred by 58% (36) and 17.7% (11) respectively. 24% had no preference.

Conclusions: Hand compression can be considered as a more patient friendly way of occluding proximal venous drainage to facilitate superficial venous canulation. All tourniquet related complication can be avoided with this method.

Explanation: Hand compression probably activate tactile and thermal sensory receptors and mask the pain as described in gate theory of pain control. It also provides adjusted pressure to occlude what is needed.

Chronic venous disease among nurses in operating room and outside operating room

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Background: Varicose vein is very common in nurse. Interestingly operating room (OR) nurses are expected to have high prevalence of varicose vein because of long standing hours in OR. We wonder whether the prevalence of varicose vein in OR nurse was higher than non OR nurses.

Methods: A cross-sectional study was performed between June 2013 and May of 2013. The study population were non OR nurses and OR nurses at Maharaj Nakorn Chiang Mai. Data was collected by questionnaire. The first section of questionnaires were about personal characteristics, risk factors and history of chronic venous disease. The second section of questionnaires were about quality of life by using Chronic Venous Insufficiency Questionnaire-14 (CIVIQ-14). The physical examination was performed by the investigators for the varicose vein based on the clinical finding using CEAP standards (C: Clinical, E: Etiological, A: Anatomical, P: Pathophysiological). Descriptive statistics of continuous variables were presented using mean±standard. Categorized variables were presented using n percent. Differences between two groups were analyzed with Chi-square or T-test/Mann Whitney U test. This study was approved by our local Ethic committee. This study was supported by Chiang Mai University.

Results: A total of 222 nurses participated were females (94.1%), aged between 41 and 50 years (37.60%), non OR nurse (55.4%) and OR nurses (44.6%). Regarding to severity of varicose vein (CEAP) in nurses, the most frequent stage was C1 (66.5%), C0 (20.8%) and C2 (12.7%). The prevalence of C0, C1, C2 was significantly different between two groups (P=0.000). The prevalence of C1 in non OR nurses and OR nurse was 72.1 and 59.6% respectively, whereas the prevalence of varicose vein (C2) in non OR nurse and OR nurse was 16.4 and 8.1% respectively. However, the quality of life was not significantly different (85.66±12.04; P=0.962) between two groups.

Conclusions: The results suggested that prevalence of varicose veins (C2) in non OR nurse seems higher than than OR nurse but the quality of life was not difference between two groups.

Survey and analysis of intravenous practice standard: a Chinese government document on intravenous administration

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Background: Intravenous catheter for medications delivery or fluid administration is one of the most important therapeutic action in patients. More than 90% inpatient patients had peripheral catheters in China. Chinese government has published the “Intravenous practice standard” to manage clinical intravenous practice and we investigated the implementation status of it.

Methods: A questionnaire survey was conducted in March, 2017. Database including disease, work age of nurse, catheter gauge, indwelling period, medication characteristics, site, flush frequency, dressing, phlebitis and complications was built with Excel software, which was described as percentage and frequency. The Statistical Package for the Social Sciences (SPSS) version 17.0 software (SPSS Ltd., Chicago, IL, USA) was used to perform all statistical analyses.

Results: Intravenous infusion rate was 76.87%, while the rate of emergency room was peaked to 96.11%; Peripheral intravenous catheter (PVC), peripherally inserted central catheter, central venous catheter, port-catheter and steel needles were widely used in the hospital. PVC was the most popular device, counting 77.91%, and 78.12% of PVC, peripherally inserted central catheter, central venous catheter, port-catheter and steel needles were widely used in the hospital. PVC was the most popular device, counting 77.91%, and 78.12% of PVC site met the standard as well as 90.17% of PICC site met the standard. There were 579 complications cases relating to intravenous treatment, 386 were drug osmosis and 111 were catheter-related blood stream infection.

Conclusions: Intravenous therapy had to be controlled legitimately and the selection of the intravenous site should be more reasonable and scientifically; Hospital and nursing management department should pay more attention to enforce the intravenous standard into practice to promote clinical health care.
The correlation analysis of self-management behavior with self-efficacy of patients with lower extremity venous disease
Xiaoyan Liu, Pro. Jichun Zhao, Zhoupeng Wu, Lin Zhang
Department of Vascular Surgery, West China Hospital, Chengdu, China

**Background:** Investigate the relationships between patients' self-management behaviors and self-efficacy with lower extremity venous disease, and supply evidence for effective management and intervention of lower extremity venous disease for clinical medical workers.

**Methods:** In August 2015 to January 2016, a total of 120 cases of hospitalized patients with lower extremity venous disease of our vascular surgery department from sichuan completed questionnaires, including the General Information Questionnaire, Chronic Disease Self-management Behavior-Chinese version, Chronic Disease Self-efficacy-Chinese version.

**Results:** The total score of self-management behavior of patients with lower extremity venous disease ranged from 0 to 69, with an average score of 18.93±6.79, the overall level was not high. Self-efficacy score ranged from 6 to 60, with an average score of 32.25±9.65, the overall level was moderate. Self-management behavior was positively correlated with self-efficacy and its dimensions, and negatively correlated with the dimensions of communication with doctors and Common disease management.

**Conclusions:** The clinical staff should strengthen education and guidance of self-management behaviors in patients with lower extremity venous disease, promote the level of self-management behaviors and self-efficacy, improve the confidence of disease treatment and prevention, in order to achieve the purpose of health promotion.

Perioperative nutritional intervention in patients with varicose vein of lower extremity with diabetes
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**Background:** Through the implementation of perioperative nutritional intervention for patients with reasonable varicose vein of lower extremity with diabetes to help patients to establish reasonable diet, to reduce the perioperative incidence of malnutrition and standardize the clinical pathway.

**Methods:** To summarize 124 cases of our hospital from January 2016 to June 2017 from varicose veins of lower extremity in patients with diabetes. In addition to routine preoperative preparation before operation, nutritional risk screening NRS2002 scale was performed (score ≥3). In addition, 124 patients in this group had pure carbohydrate diet in preoperative 2 hours and can have special low residue diet in preoperative 6 hours. By eating 2 hours after blood glucose monitoring, if abnormal blood glucose is processed, different methods will be done accordingly. Postoperative patients after anesthesia can eat appetizers postoperative bedtime or liquid. On the first day after the operation, after breakfast, patient can eat high protein diabetes specific, over to the normal diet to help patients.

**Results:** there were no complications such as malnutrition and abnormal fluctuation of blood sugar in the 124 patients during the perioperative period.

**Conclusions:** Preoperative and postoperative nutritional risk screening for patients are required for the early detection and timely intervention of high-risk groups. Diet guidance, individualized nutritional intervention mode can reduce the patients with perioperative nutritional risk, standardizing clinical pathway, accelerating the rehabilitation of patients.
Management of chronic venous disease by primary health care
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Background: Chronic venous disease (CVD) is chronic disabling condition. The appropriate management of leg swelling in CVD provided by primary health care is important. To evaluate the management of edema in CVD provided by general practitioners (GPs).

Methods: The cross-sectional study involved 840 patients with the presence of the edema of the legs, diagnosed and treated by GPs during a one month period. Patients were classified according to the CEAR clinical classification into classes C3 (N.=445), C4 (N.=294), C5 (N.=78) and C6 (N.=23). Demographic and clinical data were obtained by physical examinations and standardized interviews.

Results: The management of patients included different types of treatment; venoactive drugs were recommended to 86%, lifestyle advice to 81.8% and compression therapy included bandages and stockings to 53.3% of patients. The other types of treatment such as physical therapy, topography or exercises were prescribed to 9.1% patients. Dual and triple combination therapies were the most frequently recommended types of treatment. Also, 56.5% of patients were referred to a vein specialist, mostly C3 and C4 patients.

Conclusions: Although GPs had undergone a course in phlebology before they were included in the study, patients did not receive complete management of their condition such as compression and physical therapy. Continuous training of GPs and clinical guidelines for the management of CVD may help GPs to make adequate decisions.

Assessment of scrap vehicles tyres in the Northern Cyprus
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Background: Recently, the problem of used vehicle tires has become a focus in the Northern Cyprus. In this paper, the scope is to study the potential benefits of recycling scrap Vehicles tires in Northern Cyprus. Cyprus is not an industrial country and has no serious pollution problems. The coastal area is under continuous pressure from tourism, recreation, urban and infrastructure development, and to a lesser extent, agricultural and industrial development. The assessment approach performed for tires used by Northern Cyprus. They have developed a cost effective, environmentally friendly method for transforming used tyres into commercial-grade steel, oil or bio-oil, off-gases as green energy and Carbon Green. The latter of the scrap tyres are environmentally friendly replacement for carbon black required for new rubber tyre manufacture. The activity recycles 100% of these tyres into useable product to meet the EU’s stringent criteria in this aspect. Unlike other processes of tyre disposal or recycling, they produce no carbon char which is deemed a hazardous waste.

Conclusions: In conclusion, the energy generated at the factory can also be reused – a true recycling activity and providing a sustainable and environmentally friendly process contributing to global targets to reduce total carbon emissions.

The pitfalls of managing a multicenter clinical trial
Rebecca Lawton
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Background: The management of a clinical trial in a highly regulated and complex healthcare environment can be an extremely challenging role, each stage from set up to close out associated with its own unique problems. Methods: In the UK, the NIHR HTA programme recognise the importance of a trial manager in the successful conduct of a clinical trial. Trial managers must take a multidisciplinary approach to navigating the pitfalls encountered throughout the lifecycle of a study and have the scope and know how to develop and implement contingency plans.

Results: Once a proposal has been reviewed and funded, practical issues of implementing and maintaining trial management systems emerge. Obtaining relevant approvals, conducting feasibility and risk assessments, securing appropriate resources, negotiating complex contractual agreements, managing financial reconciliation and employing research staff are just some of the difficulties encountered before any patients are randomized. Once the trial is set up at each site focus adjusts to patient recruitment, which is inevitably more difficult than suggested in the research protocol. SUSARS, SAEs and AEs must be actively managed and the rights and wellbeing of the patients maintained.

Conclusions: Whatever the size or scope of a clinical trial the pitfalls are many and various. Issues not actively identified and managed can affect study timelines and ultimately the success of the trial. However, in the right environment with established and supportive structures almost all problems are surmountable.

Diagnosis of complex venous pathology in lower limbs with multislice TC 3D
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Background: Multislice 3D (TCM) tomography investigation of complex venous pathology in the lower limbs, evaluating the superficial and deep venous system in primary and recurrent venous insufficiency. Demonstrate its usefulness in difficult diagnosis and choice of treatment.

Methods: Analysis of two hundred CTL phlebographies performed to 100 patients with primary and complex recurrent venous insufficiency in the lower limbs within 40 months, with contrast injection in the arm and dorsum of the foot. All patients were studied with venous color echodoppler and evaluated prospectively and observationally considering the following variables: clinical according to stage CEAR, surgical history, diagnosis of leakage points, flow bypass circuits and re-entry points.

Results: The 3D anatomical study as a complement to color Doppler echocardiography allowed a detailed study of the complex venous pathology of the lower limbs, determining statistically greater complexity in the Poplitea fossa and the inguinal lymphogranulionar vein network.

Conclusions: The MCT is an excellent way to study the complex venous pathology of the lower limbs, especially in cases of recurrences and areas of difficult evaluation, such as the popliteal fossa and the inguinal lymphogranulionar vein network, giving more complete anatomical information and providing Hemodynamic data not available with Doppler. This study was essential for therapeutic planning in complex patients.

Use of muscle layer to stop intervertebral venous bleeding
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Background: Bleeding from ay trauma like penetrating sharp cutting injury is not very much uncommon. A variety of methods of hemo-
stasis have been described, all with mixed degrees of success. It has been observed that the arterial bleeding can be easily stopped, while the venous bleeding sometimes becomes very difficult to stop. In some instances it is temporarily closed by giving pressure by other things. But when the amount of bleeding is much and cannot be accessible it becomes very difficult. In this case, we have used Trapezius muscle layer to provide tamponade effect to the accidental intervertebral venous bleeding point in our patient with severe recurrent intervertebral venous bleeding.

**Conclusions:** This technique was successful and may be considered in case of problematic hemorrhage when other techniques have failed or not applicable.

### Chicken consumption on patient with varicose veins at Maharaj Nakorn Chiang Mai Hospital in Thailand

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**Background:** Although the risk factors determine varicose vein like female hormone intake was well established, but the nutritional association has never been investigated properly. The aim of this study was to investigate the impact of various food intake on varicose veins patients at Maharaj Nakorn Chiang Mai hospital in Thailand.

**Methods:** A cross-sectional study was conducted between December 2012 and November 2014. Patients at out-patient department (OPD) 101 at Maharaj Nakorn Chiang Mai hospital, Chiang Mai, Thailand, aged >18 years were invited to be concerned in this study. Patients were questioned about their demographic data, frequency of meat consumption and physical measurement for the varicose veins according to CEAP classification (C: Clinical, E: Etiological, A: Anatomical and P: Pathophysiological, respectively). This study was approved by our local Ethic committee. This study was supported by Chiang Mai University.

**Results:** A total of 558 eligible outpatients were recruited for the study. The most of patients were females (78.9%) and aged >50 years (47.1%). The average of body weight, height and body mass index (BMI) were 58.8±11.5 kg, 158.1±7.2 cm and 23.5±4.0, respectively. 17 patients out of 558 were diagnosed with high severity of varicose veins (C3 to C6=3.14%). We also found that the percentage of C3 to C6 was more than C0-C2 in those patients who were over 50 years old (94.1%, P=0.001), high body weight and BMI (73.8±13.9 kg and 28.8±4.4, P=0.000). About meat consumption only chicken intake demonstrated different association with varicose veins. Interestingly, patients with regularly consume chicken had the lower risk of varicose veins than those patients who sometimes or never consumed chicken (51.2%, 40.1% and 8.7%, P=0.022).

**Conclusions:** People who consumed chicken regularly may have a lower chance of advance chronic venous diseases.
It is demanded from the physician part to have good skills. The ankle-foot sclerotherapy before treating it has to be performed. Clinical examination, USG diagnostics, and usually is the sign of venous insufficiency and venous stasis. It is very common in the elderly ages and has lots of complications, such as bleeding-lip dermatosis ulcers. With this abstract, we show the benefits of sclerotherapy in ankle veins from the esthetic and pathology point.

**Methods:** At our case in private clinic, we had 100 patients treated for ankle telangiectasias C1-C2 classification with the use of polidocanol doam sclerotherapy 0.5% concentration in microfoam and liquid techniques. In this abstract, we show the feasibility and the technical difficulties you have to overcome to have a successful treatment.
Comparing the efficacy of Venaseal vs. Variclose in treatment of incompetent saphenous trunks

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Background: Cyanoacrylate is a reasonably new non thermal method to seal lower extremity superficial varicose veins. Currently there are two products available in Australia called Venaseal and Variclose. The main ingredient of both is n-butyl-2-cyanoacrylate(n-BCA).

Purpose: Venaseal and Variclose are reasonably new methods of treating varicose veins. A few centers in Australia have started utilizing this product and there are limited studies on the efficacy of them. By reviewing articles I would like to find out which product is more suitable for incompetent Saphenous Trunk treatment.

Methods: Utilizing SAGE articles and also relevant online resources such as FDA website.

Results: According to a few different articles and studies the most successful occlusion rate of treating Saphenous Trunks by Venaseal at 1 week, 1, 3, 6, 12 and 24 months were 100%, 95.3%, 100%, 98.9%, 92.9% and 94.3% respectively, and the success rate of treating Saphenous Trunks by Variclose at 1 week, 1, 3 and about 6 months were 100%, 96.7%, 96.6% and 100% respectively.

Conclusions: Based on the available studies and experience with Venaseal and Variclose the short term result in the treatment of truncal varicosities is promising. It is believed the size of the trunk is an important predictive factor of success rate with these products. Very little is known about Venaseal and Variclose and their long term efficacy. More studies are required to determine the outcome of treatment with the above products.
ULTRASOUND

Superb microvascular imaging (SMI) detects reflux in superficial veins in the skin
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Background: The presence of reflux in the microvenous network has been demonstrated using resin casting (Vincent, Jones et al. 2011). Our objective was to determine whether microvenous reflux could be detected in the intact limb using a novel ultrasound modality, superb microvascular imaging (SMI) compared with colour Doppler.

Methods: We recruited patients with clinical and ultrasound-detected venous insufficiency (CEAP Class ≥4; limbs N.=26) and control participants with no venous disease (CEAP 0; limbs N.=10). A region of skin in the medial gaiter was assessed using both SMI and colour Doppler. The presence or absence of reflux in response to foot augmentation was determined, along with the diameters and depths of responsive vessels.

Results: In patients with venous insufficiency, reflux in response to provocation was visualized in a greater average number of vessels using SMI compared with colour (range 2-26 vessels vs. 0-14 vessels, P<0.0001). In the control participants, reflux was only seen in one limb with SMI and none with colour. The sensitivity of SMI also appeared superior, with a smaller minimum size of refluxing vessels demonstrated (interquartile range: 0.36-0.92 mm) than with colour Doppler (0.70-1.44 mm). Of all the vessels seen to reflux with SMI, the majority were located <3 mm below the skin surface.

Conclusions: SMI is the preferred ultrasound modality to detect reflux in the microvenous circulation. It is currently being used to explore the relationship of the microvenous circulation to the progression of skin changes in chronic venous disease.

The assessment of lipodermatosclerosis using shear wave elastography
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Background: Sheer Wave Elastography has been previously used in the assessment for liver conditions such as cirrhosis in order to stage fibrosis. There is currently no literature outlining the application and quantification of vascular conditions that involve superficial structures and their improvement using endovenous interventions.

Methods: This was a pilot study to assess the thickness of the skin, subcutaneous tissue and fat layers in conditions such as Lipodermatosclerosis. Sheer wave elastography using a Toshiba Aplio 500 Ultrasound Machine and a 10-14mHz linear array probe was performed in patients with a CEAP classification of C4b. Images of the most indurated region above the medial malleolus were obtained and a Shear Wave Ratio (SWR) obtained by comparing to an area of normal skin 1cm below the umbilicus. Four measurements were taken to assess the velocity (m/s) and stiffness (kPa) starting at just below the skin and going down vertically.

Results: The results showed that there was a significant decrease in the patient’s SWR post endovenous interventions in comparison to pre-intervention, with some suggesting an increase in elasticity of 50%.

Conclusions: The SWR is an objective measure of skin elasticity in patients with C4b disease and the effect of treatment.
VASCULAR LASER THERAPY

Midterm clinical outcomes of endovenous laser ablation for the treatment of varicose veins

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Background: We evaluated the surgical outcomes, improvements in subjective and objective symptoms of varicose veins, and changes in venous function after endovenous laser ablation (EVLA) using a 980-nm diode laser.

Methods: Between October 2011 and September 2015, 704 limbs (525 patients) were treated for incompetent saphenous veins at our institution. We studied the operative complications, venous clinical severity score (VCSS), and surgical outcomes of the treated limbs. We assessed saphenous vein occlusion, endovenous heat-induced thrombus (EHIT), and deep vein thrombosis (DVT) using duplex ultrasonography and measured venous filling index (VFI) using air plethysmography, preoperatively and at 1, 6, 12, 24, and 36 months postoperatively.

Results: Thirty-six months after surgery, the technical success rate (cumulative occlusion rate) was 99.2%. Although EHIT occurred in 8.4% of limbs, class 3 EHIT occurred in only 0.9%. Severe complications such as DVT and skin burns were not observed. The mean preoperative VCSS was 5.1±2.2, and this value improved to 2.1±1.1 at 1 month, 0.7±1.1 at 12 months, and 0.7±1.0 at 36 months postoperatively. The mean preoperative VFI was 6.0±3.4 mL/s, and this value improved to 2.2±1.4 mL/s at 1 month, 2.3±1.7 mL/s at 12 months, and 2.5±1.9 mL/s at 36 months postoperatively. At 36 months after EVLA, the mean VCSS and VFI values were significantly lower than the preoperative values.

Conclusions: EVLA did not cause severe complications, and good surgical outcomes were obtained. VCSS and venous function were significantly improved at 36 months postoperatively. EVLA is a safe and effective treatment for incompetent saphenous veins.

Influence of wavelengths 1470 and 1560 nm on postoperative pain after endovenous laser treatment in patients with varicose veins

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Background: Comparison of pain syndrome after performing endovenous laser treatment (EVLT) of GSV in the early postoperative period using wavelength 1470 nm and 1560 nm.

Methods: Prospective study included 380 patients (259 female) with primary varicose veins of the lower extremities. Patients age was 20-79 years (Me 43; IQR 35-54). CEAP: C2 - C5. EVLT performed by diode laser 1470 nm (N.=244) and 1560 nm (N.=136). Assessment of pain was performed according to the visual analogue scale (VAS). The follow-up was performed at 1, 3, 5, 7, 14 and 21 days after EVLT.

Results: When compared two groups (1470 nm and 1560 nm) at various times after EVLT, pain score was significantly lower in the group 1560 nm 3,3 (IQR 2,2-4,3), 1470 nm - 3,6 (2,3-5,2) P<0,04. On different days, this trend continued. In the group where the used wavelength of 1470 nm, was an increase in the level of pain on 1st day after EVLT to 9% compared to preoperative pain from 3,3 to 3,6 points (P=0,01). On day 7, pain was lower values by 30% (P<0,0001). On the 14th and 21st day the pain was significantly lower in the 1,8 and 4,1-fold respectively. In the group with the wavelength 1560 nm decreased pain syndrome since postoperative days 3 to 17% (P=0,002). The median pain score was 2,4 (IQR 0-3,4). On the 7th and 14th day pain reduced by 31 and 69%, respectively. On the 21st day of the median pain score was 0 points, IQR 0-1,6 (P<0,0001).

Conclusions: In applying the wavelength of 1470 nm was a significant increase in pain on the first postoperative day, while at the wavelength of 1560 nm is not amplified pain. A significant reduction pain in the preoperative period was in both groups: at 1470 nm from 7 days of the postoperative period, and at 1560 nm from 3 days.

About a day surgery of varicose vein in acute care hospital

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Background: In Japan, the outpatient surgery of varicose vein is often treated with laser ablation or radio frequency ablation for health insurance coverage. On the other hand, inpatient surgery for 2-3 days has been done in acute care hospital. We have started the day surgery treatment of saphenous varicose vein in our acute care hospital, and can have very favorable outcome.

Methods: The study was limited to individuals with saphenous varicose vein who applying for day surgery (539 extremities). The patients were given an explanation of the day surgery and the leaflet that provide a treatment protocols in outpatient setting. Under general anesthesia with target-controlled infusion (TCI) and tumescent local anesthesia, the day surgery was performed using 2 ring radial fiber with 1470nm diode laser or radiofrequency catheter. After surgery, monitoring of the electrocardiogram and O2 saturation was done in the recovery room. After 2 hours, the surgical patient was examined about gait and range of motion by the anesthesiologist. If the modified post-anesthesia discharge scoring system (MPADSS) offered no difficulty, they may be allowed to send home. On 2 day and 28 day after operation, we diagnosed complication on an out-patient basis.

Should warfarin and the other antiplatelet drugs be discontinued before endovenous laser treatment & ambulatory phlebectomy?

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Background: 1470 nm radial fiber EVLT has been shown to be a safe procedure. Our aim was to determine if warfarin and the other antiplatelet drugs should be stop before EVLT & ambulatory phlebectomy?

Methods: Retrospective analysis on 1470nm EVLT with radial fiber patients between Jan 2016 Dec 2016.

Results: There were 2 patients in warfarin group and 99 patients in the other antiplatelets group. The mean age was 66 (32-80) years. 1470nm radial fiber Laser energy used was 6-8 Watts. And also all patients was
treated by ambulatory phlebectomy. These complications were phlebitis (1/101) and bruising (10/101).

Conclusions: Major complications are not occur in patients who keep going warfarin & antiplatelet drug during EVLT with ambulatory phlebectomy. Warfarin & other antiplatelet drugs have been continued before EVLT are useful than stopped medication. Large prospective studies are needed to validate this finding.

EVLA how we do it in Dubai
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Background: EVLA or EVLT however we call it, is performed all around the world but complete vein treatment is a combination of methods and can be performed differently in different places, so its useful to go into more details to clarify our similarity or difference.

Methods:
Clinical visit
History
Examination
   leg measurement, 20 points
Ultrasound;
   semi standing
   leg augmentation
every vein is examined all the way
reflux locations drawn and documented
30-45 minutes
0.5-0.9 second reflux, considered moderate
more than 1 sec-continues, considered severe.
Mild or moderate reflux
A course of medicine for 3 months
Compression garment Class II
Life style changes
Severe reflux
EVLA unilateral
LM heparin before the operation, 6 days after
LA with mild sedation decided individually
Vein puncture, fiber insertion in tilting position
Tumescent Local Anesthesia is done around this needle. After that a bare-tip laser fiber replaces this needle and the veins are ablated by 810nm diode laser (Endovenous Laser Treatment DT-810, DIOTECH, Korea). 20 patients with Varicose Ablation were observed more than 6 months after the operation.

Results: No patients had complication such as skin burn or sensory nerve disorder. Their superficial varicose veins had been occluded satisfactorily in 6 months. Some patients had mild pigmentation but they were getting well as time passed. One patient had a superficial thrombophlebitis after ablation.

Conclusions: The greatest feature of Varicose Ablation is scarless. It gives delight to the patients who desire the beauty of legs. Also it is suitable for the patients with dermatitis or ulcer. The subcutaneous bleeding of this method is fewer than Stab Avulsion method. Then it is really useful for the patients taking anticoagulants.

How can the SFJ treatment be made more effective?
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Background: We evaluated for occlusion rate of a great saphenous vein (GSV) and its tributaries by ultrasound scan after varicose veins treatment with Radiofrequency Ablation (RFA). The dissection of the tributaries near SFJ has some variations, but normally, there are five divergence: superficial epigastric vein, external pudendal vein, superficial circumflex iliac vein, medial accessory saphenous vein and lateral accessory saphenous vein. It can be presumed that we can reduce the recurrence rate if the 4 tributaries are occluded except the superficial epigastric vein which flows into the center.

Methods: The purpose of this research is to reduce recurrence risk after surgery based on this evaluation results. The subject of this study is 300 treated cases (average age 65.5±11.6 years / 90 males and 210 females) using Endovenous Closure™ from May to November 2015. In all cases, the catheter tip was positioned 15mm from the SFJ. On the next day of surgery ultrasound scan was performed for evaluation.

Results: After RFA, the distance from SFJ to the occlusion was 13.8±6.8 mm on the average. The occlusion rate of main trunk of GSV was 100%. As for tributaries, the cases which the blood flow was found were regarded as positive. The cases which became occluded and which was not able to identify itself were regarded as negative. The average number of tributaries was 0.62±0.63 which the blood flow was found. The breakdown is as follows: 0:139cases/1:137cases /2:24cases /3:0cases /4:0cases.

Conclusions: The position of the tip of the catheter effective for prevention of recurrence was 15 mm.
**Tumescent anaesthesia: does composition of the tumescent matters?**

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**Background:** Thermal techniques for the treatment of the varicose veins are a standard treatment now. Tumescent anesthesia is one of the most important part of the procedure. We analyzed that most of the physicians do not completely understand the physiology of the contents of the solution and also how we can modify the content and get better results for our patients.

**Methods:** We took interviews of various physicians and understood that various things are being done without any scientific studies to support the practice.

**Results:** We try to get all the data together and try to take lectures in various scientific meeting and training programmes so that the understanding of tumescent anesthesia can be improved. One example is that cold saline is better than the room temperature saline. But there is no scientific evidence to support the usage of the said procedure.

**Conclusions:** Understanding of the contents and review of the literature of the very important technique is critical and it can help in modifying your practice.
COMMON CHARACTERISTICS OF ISOLATED VARICES OF THE FOOT AND ROLE OF THE DISTAL PERFORATING: A CASE SERIES

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Background: The foot varicose veins has long been neglected by the phlebologist although is often responsible for a real aesthetic discomfort. It can be sometimes even a source of thrombotic complications. Little is known about the pathophysiology of independent foot varices. We aimed to identify common clinical and ultrasound US characteristics of isolated varices of foot.

Methods: 22 feet with isolated varices were identified clinically and by ultrasound US in 12 patients free of saphenous reflux. A standardized measurement of the Djian-Annonier angle on radiography was used to quantify the foot static disorders. We performed a Duplex colour examination in all patients with the complete assessment of the superficial and deep system of the foot.

Results: None of the patients were symptomatic. However 8 patients had a cosmetic complaint. Clinical examination and radiography found Foot Static Disorders FSD in all patients. Two other common features are worth noting: The constant dilatation of the perforating vein of the first inter-metatarsal space IMS and secondarily that of the 4th IMS (3-6 mm). Interestingly, the venous flow recorded at the 1st metatarsal inter-space perforating is unidirectional after toe curl, directed from the superficial to deep part. On the contrary, manual compression of the calcaneal confluent cause a bidirectional flow registered on the same perforating. In fact, when weight bearing and flexion of the first toe (during venous foot pump activity) the prevalent flow is directed into the posterior-tibial veins.

Conclusions: Previous studies suggest that the venous reservoir is located in the lateral plantar veins. When walking with FSD, the abnormal contact of lateral sole contributes to an increase in the “preload” of the plantar veins resulting in a lack of venous drainage. The redirection of flow by the singular and valvless perforating of the 1st and 4th IMS in a “dead end system” may be one of the compensatory mechanisms until creating a chronic and irreversible dilatation communicating to dorsal varices of foot. The clinical finding of isolated varices of foot should lead us to search for foot static disorders FSD.

VENOUS HAEMODYNAMICS AND FLUID MECHANICS

An incidence of antegrade diastolic blood flow in Giacomini’s vein and the role of the overload mechanism in the development of venous disease

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Background: Antegrade diastolic blood flow (ADBF) is described as a pathological pattern of blood flow in the Giacomini’s vein (GV), associated with varicose transformation and classical reflux in great saphenous vein and tributaries. There are two theories of its appearance: the theory of “siphon” which gives the main role to negative pressure gradient in varicose tributaries, and “overload” theory which means hypervolemia of GV due to blood overloading through the insufficient saphenopopliteal junction (SPJ). “Overloading” mechanism wasn’t described obviously. However, apparently, it was implied by the phlebologists, who recommended high ligation or equally obliteration of SPJ for radical treatment of varicosities associated with ADBF in GV.

Methods: 514 legs of the patients, sequentially referred for the operation in 2016, were examined with duplex ultrasound. 496 legs with the recognized pattern of reflux were included in our study. We assessed the presence of ADBF in GV, GV reflux, SPJ sufficiency, SSV & GSV sufficiency.

Results: SPJ insufficiency was found in 101 (20.4%) legs. SSV reflux was found in 88(17.8%). The GV reflux was identified in 8 legs (1.6%). ADBF in GV was found in 13 (2.6%), of the legs has varicose tributaries located exceptionally above the level of the saphenopopliteal junction. The location of varicose tributaries above the “escape point” of reflux (in some cases of ADBF) demonstrates the failure of the “siphon” theory, however, it consistent with the overload theory.

Conclusions: Blood flow disturbances of the GV with clinical manifestations were present in 4.2% of legs with varicose veins (C2-C6, CEAP). The ADBF through the GV is observed in 62% of them. ADBF was strongly associated with SPJ incompetence. The location of varicose tributaries above the “escape point” of reflux (in some cases of ADBF) demonstrates the failure of the “siphon” theory, however, it consistent with the overload theory.
**VENOUS INTERVENTIONS**

**Pain assessment during radio frequency or laser thermal ablation of the great saphenous vein: a prospective multicenter study**
Sebastien Gracia¹, Fabrice Abbadié², Matthieu Josnin³, Pierre Combes³, Bertrand Chauzat⁴

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**Background:** Background: we aim to evaluate the level of pain described by patients during the local tumescent anesthesia when we practice a thermal endovenous ablation of the great saphenous vein. We tried to focus on causes influencing this pain.

**Methods:** Method: prospective multicenter study. We asked all consecutive patients treated for a great saphenous vein with thermal ablation between the 1st of June 2014 and the 15th of October 2014 to indicate the level of pain they felt at three different times during the local tumescent anesthesia (near the sapheno-femoral junction, in the middle of the thigh and at the medial side of the knee). All patients were treated for an endovenous thermal ablation of the great saphenous vein.

**Results:** The mean pain was 4.6±1.8 (range 0-10) for 96 consecutive patients. Almost 17% patients described a major pain (numeric scale between 7 and 10). Long procedures are associated with a higher level of pain (more than 30 minutes). Moreover, when the anesthesia is done in the medial side of the knee, the pain is significantly higher as well. The level of satisfaction does not vary regardless the level of pain.

**Conclusions:** Conclusion: even if the majority of these procedures could be realized successfully under local tumescent anesthesia only, we must find, nonetheless, anesthesia solutions for those who experience more pain.

**Thermal ablation of saphenous veins: ways to make the procedure less painful**
Sebastien Gracia¹, Fabrice Abbadié², Bertrand Chauzat³, Pierre Combes³, Matthieu Josnin³

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**Background:** Nowadays, the gold-standard of treatment of saphenous veins has changed. Thermal ablation (radiofrequency and laser) has become the treatment of reference.

**Methods:** We reviewed in the literature procedures which have been already evaluated.

**Results:** Less desirable procedures: General and epidural anesthesia (no feed-back from patients). Assessed but non-efficient procedures: Lidocaïne-prilococaïne cream, various temperatures of solution (warm or cold), miscellaneous anesthetic products (bupivacaine and ropivacaine). Not assessed yet but appealing: hypnosis. Assessed and efficient: create a soothing ambiance (dim light, low voice, calming music, relaxing videos, breathing technics, selective vocabulary); gate control; appropriate needle; laughing gas (nitrous oxide); buffering solution with sodium bicarbonate.

**Conclusions:** In conclusion, the best way to lower pain and stress is probably a mix of the assessed and efficient methods adapted to each patient.

**Aesthetic ambulatory surgical therapy of varicose veins of a large diameter**
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**Background:** The aim of this paper is to present VANST (Varices’ Ambulatory Non-stripping Surgical Therapy) - a particular minimally invasive surgical method of treatment of the large diameter varicose veins. This ambulatory surgical technique consists in the complete disconnection of the pathologically dilated superficial veins.

**Methods:** This retrospective study regards cases operated on between September 1998 - December 2016. Only cases with varicose veins of a diameter of 40 mm or greater (observed in minimum two segments with patient in standing position) where included in the study. Under local anesthesia through a gentle dissection the varicose veins (including saphenous trunks) and the insufficient perforators are intercepted, sectioned and ligated. The varicose veins remain in place but they are taken out of the venous circuit and become just empty non-functional tubes.

In this manner both the venous flux and reflux are eliminated. The patient is immediately mobilized after the operation and leaves the clinic after 30 minutes.

**Results:** Number of cases in the study: 648 limbs (623 patients – 166 women and 457 men).

**Conclusions:** The surgical treatment of the varicose veins has changed! VANST is an ambulatory minimally invasive surgical procedure and an excellent alternative to stripping for treating large diameter varicose veins.

**New variable cycle mode with radiofrequency segmental thermal ablation for incompetent saphenous veins**
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**Background:** Radiofrequency segmental thermal ablation (RF) is used worldwide for incompetent saphenous vein treatment. Conventionally, one or two cycles are used for any diameter of veins; the fixed cycle (FC). On the other hand, from our phantom experiment study, we have
found that the endpoint RF power of 12W provides the optimal tissue degeneration while the cycle repetition number is less important; the variable cycle (VC). The aim of this study is to evaluate the clinical advantage of VC mode for obtaining the endpoint RF power of 12W compared with the conventional FC mode.

**Methods:** The VC mode in 115 limbs and the FC mode in 115 limbs are performed on a daily basis surgery. The VC mode is designed to repeat the 20-second cycle indefinitely until the end point power is obtained at least 12 watts. The mean patient age was 64.2±12.9 in the VC group and 63.9±14.2 in the FC group. The number of female patients was 51 (45%) and 63 (55%) respectively. Only Five analgesic tablets were prescribed for occasional postoperative pain.

**Results:** The total ablation cycle number in the VC group was almost twice that of the FC group, and the maximum was 24 cycles. Occlusion rate was 100% and GSV shrinkage rate with VC seemed to become more apparent at 1 month than it was with FC. Visual analogue pain score at 1 week and 1 month in the VC group showed lower than that in the FC group, thus analgesic medication was also limited. There was no EHIT≥Class 2 and the bruising appearance was the same in the two groups.

**Conclusions:** The VC mode appeared to be more reliable, effective and safe regarding GSV shrinkage, as well as reducing the postoperative pain. Therefore, this method seems to be better for inducing effective degeneration according to heat transmission physics.

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**Chronic venous disease invasive treatment in the patients over 70 yrs. Is valid and clinically applicable – lesson learned**

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**Background:** The growing life span of the population influences also on the age of the phlebological patients treated in the office and ambulatory settings. The aim of the study was an evaluation of the safety and efficacy of the invasive phlebological treatment in the patients over 70 yrs.

**Methods:** The group of 308 patients with chronic venous disease (class C2-C6) aged from 70 to 95 years was assessed. All the patients underwent the invasive phlebological procedures due to the chronic superficial venous disease. In the group, the following procedures were performed: EVLT-186, ultrasound guided sclerotherapy-97, tumescent assisted ultrasound guided sclerotherapy-37, sclerotherapy-62 and surgery-6. In the analysis, the treatment indications, risk factors, complications as well as clinical results were evaluated.

**Results:** In the assessed group, no serious adverse events and complications were recognized, however, in the elderly patients the higher EHIT rate after EVLT procedures was reported. Except 6 patients qualified to surgical treatment, all the patients underwent office based treatment without the necessity of hospitalization. Despite an advanced age, in some of the patients, the cosmetic aspect of the diseases was still valid as the main treatment indication.

**Conclusions:** In patients over 70 years, an invasive phlebological treatment is valid and potentially clinically applicable. An implementation of the minimal invasive technologies, including foam sclerotherapy, as well as tumescence assisted sclerotherapy and endoluminal thermal vein ablation allow to treat the elderly and fragile patient population with accepted safety and good clinical efficacy.

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**The changes of surgical treatment for primary varicose veins in a day surgery clinic: from stripping surgery to endovenous thermal ablation therapy**

Junichi Utou
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**Background:** Since Japanese government approved endovenous thermal ablation (EVTA) for public health insurance system in 2011, EVTA has become a popular procedure because of its low invasiveness. Changes of surgical procedure for primary varicose veins and the clinical results in our day surgery clinic were evaluated.

**Methods:** Since May 2010, 5004 primary varicose vein patients underwent day surgery. Tumescent local anesthesia and an intravenous administration of propofol and remifentanil were used. The surgical procedure was stripping of the incompetent saphenous veins or EVTA of those. Device for EVTA was Bioletec 980 nm diode laser with bear-tip fiber (N.=278), Bioletec 1470 nm diode laser with radial fiber (N.=1130), and ClosureFAST radiofrequency ablation system (N.=683). Minipliebectomy was added by stab avulsion technique. Patients were followed-up on POD2, POD7, and POD14.

**Results:** All patients could go home within 30 minutes after the surgery. Mean operation time was 31 minutes in the stripping group and 27 minutes in EVTA group. Postoperative minor complications such as hematoma, phlebitis, dermatitis, infection, and calf DVT, were observed in 5.7% of the stripping group and 2.8% of EVTA group. However, severe complications such as pulmonary embolism, proximal type DVT, or Class 3-4 EHIT have never experienced in all of the patients. The percentage by year of EVTA was 0% in 2012, but increased to 12% in 2013, 55% in 2014, 82% in 2015, 95% in 2016, and reached to 97% in 2017. After the stripping surgery, 3 patients (0.1%) needed late reoperation because of recurrent varices. In contrast, no patients of EVTA group needed reoperation.

**Conclusions:** The clinical results of our day surgery for primary varicose veins seems to be acceptable. Trend of varicose vein surgery may expect to shift from stripping surgery to further low invasive procedure like as EVTA.

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**Three years experience in Kosova with EVA (endovenous ablation)**

Valbon Gashi
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**Background:** This prospective study evaluates the results of Endovenous ablation (EVA). There are three modalities which are used for the treatment of varicose veins: EVLA (Laser 1470), Closure Fast (Radio-Frequency) and Clarivein

**Methods:** They were prospectively collected for all patients undergoing EVA for varicose veins in our clinic including clinical outcomes (CEAP classification) and post-operative duplex.

**Results:** 379 EVA procedures were performed from April 2014 to May 2017. 346 LSV cases, 21 SSV cases, 12 patients with AAS. 17 patients were treated with EVA bilateral. 96% were done under Tumescent Anesthesia and 4% underwent general anesthesia. No intra-operative complications were seen, and a 0.3% incidence of DVT. During a median follow-up of 12 months there were less than <1% (3) on duplex evidence of recurrence and recannalization of the treated vein.

**Conclusions:** Our 3-year experience suggests that EVA are very safe and effective alternative compare to conventional surgery for the treat-
Ligature and section of the saphenopopliteal junction with (intraoperative) catheter sclerotherapy in the treatment of the small saphenous vein (a highly effective alternative)

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Background: The treatment of insufficient small saphenous vein is one of the not so common situations as the great saphenous vein for phlebologists. Ligature and section of the saphenopopliteal junction associated to sclerotherapy with (intraoperative) catheter in the small saphenous vein is a simple procedure.

Methods: Between March 2012 and February 2017, 88 patients were performed LSCS, and were followedup for 2 years with clinical check-ups and Doppler ultrasound. CEAP 2-5 were included. All procedures were outpatientbased, with brief postoperative stays.

Results: Group I: SSV occluded; 43 patients; Group II: SSV Partially rechanneled, without reflux: 25 patients; Group III: SSV rechanneled, 3 patients. The results were considered excellent in 68 cases. 6 patients presented with clinical recidivism, and 19 patients presented with morbidity – most of them, transient.

Conclusions: Ligature and section of the saphenopopliteal junction associated to sclerotherapy (intraoperative) with catheter in the small saphenous vein, performed together with supplemental procedures (mini-surgeries) at CV and PV is, in 88,73% of cases, a simple, lowcost, and widely accepted procedure, and affords the great advantage of treating the whole varicose condition in a single procedure and with a high effectiveness (95.77%).

Association of radiofrequency ablation and surgical stripping in the treatment of the great saphenous vein in an outpatient setting for a better functional and cosmetic result

Francesco Artale, Roberto Chiappa
Vein Clinic, Geneva, Switzerland

Background: The methods of Endovenous thermal techniques are very well tolerated, but risks and side effects are nevertheless present. The methods of Endovenous thermal techniques are very well tolerated, but risks and side effects are nevertheless present. The methods of Endovenous thermal techniques are very well tolerated, but risks and side effects are nevertheless present. The methods of Endovenous thermal techniques are very well tolerated, but risks and side effects are nevertheless present. The methods of Endovenous thermal techniques are very well tolerated, but risks and side effects are nevertheless present.

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Clinical outcomes and quality of life after endovenous ablation for great saphenous vein incompetence: a single center prospective nonrandomized study

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Background: To evaluate the short term outcomes with endovenous thermal ablation in patients with great saphenous vein (GSV) incompetence.

Methods: CEAP classification, CEAP clinical score, Venous Clinical Severity Score (VCSS) and Chronic Venous Insufficiency Quality-of-Life Questionnaire (CIVIQ) were recorded. Follow-up including duplex scan was performed at 1 and 12 months. Primary outcome was anatomic success defined as absence of reflux or recanalization of GSV. Secondary outcomes were complications, improvement of CEAP clinical, VCSS and CIVIQ scores. Patients in whom recanalization was demonstrated were analyzed for anticoagulant or antiplatelet usage.

Results: 70 patients (24♂, mean age 52 y) were included over a 16-month period. 74% of patients were classified as C2 or C3 venous disease. 54 patients underwent endovenous laser ablation (EHLA) with a 1470 nm diode laser and 16, radiofrequency ablation (RFA). Total occlusion rate was 89%, with comparable results between EHLA and RFA. Segmental (N.=5), or complete (N.=2) recanalization was seen in 7 limbs (11%) after initial successful ablation. Anticoagulation or antiplatelet agent usage did not increase the risk of recanalization (P>0.5). All patients showed significant (P<0.001) improvement of CEAP clinical, VCSS and CIVIQ scores including those with recanalization. The complication rate was low (10%) with most frequent reported a burning sensation or numbness (3 pts) followed by superficial vein thrombosis (2 pts).

Conclusions: No difference in the outcomes was found between EHLA and RFA. Improvement of clinical and quality of life scores at 1 year was observed in all patients regardless the presence of recanalization.
by Ultrasonogram guidance. Puncture needle size was 21 gauge, 4cm or 2.5cm long needle. Sheath size was 6 F x 4 cm or 7 F x 4cm.

Results: We approached 140 (97%) cases successfully through retrograde transradial approach. 8 (3%) cases were approached through retrograde venous approach because of thrombosis of radial artery due to previous intervention or creation of radiocephalic fistula in an end to end fashion.

Conclusions: Retrograde radial arterial approach to dilate perianastomotic stenosis as well as outflow vein is a good option.

Results of management of lesser saphenous vein (LSV) insufficiency with thermal or chemical ablation with ultrasonographic guidance in a series of Salvadorian patients

Luis Francisco Rodriguez Reyes
San Salvador, Varicentro El Salvador, San Salvador; El Salvador

Background: The role of LSV reflux and its relationship with chronic venous insufficiency has been ignored and unexplored for many years. This study aims to expose the current scenario of the role of LSV insufficiency in the clinical condition of patients in El Salvador, observe therapeutic approaches and the time tracking to identify the evolution of the pathology.

Objective: To evaluate the clinical cases of patients with venous insufficiency of the saphenous vein treated with thermal or chemical ablation in the Varicentro Clinic.

Background: The role of lesser saphenous vein reflux and its relationship with chronic venous insufficiency has been ignored and unexplored for many years. This study aims to expose the current scenario of the role of lesser saphenous vein insufficiency in the clinical condition of patients in El Salvador, in addition to the available therapeutic approaches and the time tracking to identify the evolution of the pathology.

Background: To evaluate the clinical cases of patients with venous insufficiency of the saphenous vein treated with thermal or chemical ablation in the Varicentro El Salvador Clinic.

Methods: Retrospective longitudinal study, observational type.

Results: A total of 48 members were studied. The mean age was 57.4 years, with a standard deviation of 13.3 years, a median age of 57 years and a 69 year mode. The most frequent anatomic patterns were types A and B, both with a 35.4% representativeness, and in 54.2% the saphenous vein was found to be smaller in relation to the interauricular line above the popliteal void. 63.3% of the population was overweight or obese. A 48.8% of members had criteria for classifying them with chronic venous insufficiency.

Conclusions: The total occlusion of the treated veins at the observation period was 91.6% in the thermal ablation and 66.6% in the chemical ablation. Partial occlusion was observed in the remaining veins. There was a statistically significant decrease in the mean diameter of 2.2 cm at the ankle level, 1.22 cm at the middle third level and 1.19 cm at the upper third level (P<0.0001). The complications of the reported treatments are more frequent if the ablation treatment adds complementary treatments.

Implementation of propofol sedation combined with tumescent anesthesia in varicose vein treatment

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Background: The most significant problem of tumescent anesthesia is that it requires multiple injections of tumescent solution, and is therefore very painful. Some hospitals use propofol, a sedation anesthetic, during varicose vein surgery to reduce such pain. The aim of this study was to examine the effectiveness and safety of propofol sedation combined with tumescent anesthesia when performing endovenous laser ablation and phlebectomy.

Methods: Between January 1st and December 31st 2016, 428 patients underwent endovenous laser ablation and/or phlebectomy. All 428 patients were treated with propofol sedation and tumescent anesthesia. Each patient’s blood pressure, heart rate, electrocardiography and pulse oximetry were monitored throughout the operation, and O2 was applied nasally. Prior to tumescent solution infiltration, each patient was injected with propofol at intermittent intervals. The patient’s age, body weight, physical activity, and whether the patient was taking any medication were considered when deciding the amount of and time interval between each dosage of propofol.

Results: All the patients slept well, and upon waking could not recall having felt any pain throughout the operation. Because they did not feel anxious, the patients’ blood pressures remained within normal range during their sleep. Not only was it beneficial for the patients, this method of treatment was also convenient for the doctors performing the surgery. Some patients needed the chin lift technique, but their O2 saturation levels recovered within a few seconds. Only one patient required insertion of a plastic airway into her mouth. None of the patients needed endotracheal intubation or laryngeal masks.

Conclusions: This study shows that intravenous sedation using propofol is effective and safe when used with tumescent anesthesia during varicose vein treatment. However, adequate patient monitoring is mandatory. The results of this study should be confirmed in a large experimental study.
VENOUS INTERVENTIONS:
SCLEROTHERAPY

Day surgery for varicose veins of lower extremity in China
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Objectives: to discuss the feasibility and safety of day surgery for lower extremity varicose veins in China.

Methods: From December 2015 to December 2017, 1100 patients with varicose veins of lower extremity were treated with radiofrequency ablation combined with sclerotherapy in day surgery model. The rates of vein closure, complications and recurrence rates of these patients were followed-up.

Results: All patients underwent surgical treatment safely. There were no major complications during the follow-up.

Conclusions: Despite the lack of family physician support, standardized technical practices and strict follow-up systems ensure safe and effective of the lower extremity varicose vein day surgery.

Ultrasound guided foam sclerotherapy 3 years follow-up results from Paraguay
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¹Surgery, Universidad Nacional de Asuncion Paraguay, Asuncion, Paraguay; ²University of South Florida, Tampa, United States

Background: The foam guided sclerotherapy is one of the new mini-invasive treatment of the saphenous vein and accessory large veins we start our study in 2013 with ultrasound guided sclerotherapy (UGFST) in C2-C4 primary chronic venous insufficiency and in patients with recurrent great saphenous vein after stripping.

Methods: From January 2013 to January 2016 54 patients with varicose veins due to incompetent great saphenous vein were treated with ultrasound guided sclerosing foam prepared according to the Tessari method by mixing 3% tetradecil sulfate with air using 2 disposable syringes and a three way tap producing high-quality micro-foam. Clinical examination and duplex scanning before and after the treatment with a mean follow-up of 2 years were done to every patient.

Results: An average of 15 ml of foam was required to close incompetent Great saphenous veins as defined by a reflux of more than 0.5 s documented by duplex scan. At 2 years after the first case all, patients felt that their legs were treated successfully with resolution of symptoms and better quality of life with complete resolution of the bulging veins in 96% of them.

Conclusions: Foam sclerotherapy is a safe and effective therapy in treating varicose veins with high patient satisfaction and improvement in quality of life.
VENOUS THROMBOEMBOLISM - CLINICAL

The experience for VTE of endovascular therapy
Bi Jin
Department of Vascular Surgery, Union Hospital Wuhan, China

Background: VTE is a “silent killer”, anticoagulant therapy is the basic treatment. To relieve symptoms, as soon as possible to reduce and eliminate the PTS, it is important to remove thrombus.

Methods: To relieve symptoms, as soon as possible to reduce and eliminate the PTS, it is important to remove thrombus.

Results: Endovascular Therapy is a kind of important surgery methods for thrombus removal. They mainly include: CDT, balloon dilatation, stent implantation, Tapas systems, Amplatz systems, Straub systems, Trellis4 systems, Angiojet systems.

Conclusions: The Angiojet system is already applied to clinical and achieved good effect, has a very broad prospect.

Postoperative endovenous heat-induced thrombosis in patients undergoing endovenous laser and radiofrequency ablation of the saphenous vein
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Background: Endovenous laser ablation (EVLA) and radiofrequency ablation (RFA) is a safe and an effective treatment for varicose veins caused by saphenous reflux. Endovenous heat-induced thrombosis (EHIT) are known complications of these procedures. The purpose of this article is to investigate the incidence of postoperative EHIT in patients undergoing EVLA and RFA.

Methods: The patients were assessed by clinical examination and venous duplex ultrasonography before operation and at 24–72 hours, 1 month, and 1 year follow-up after operation. Endovenous ablation had been treated for 1,026 limbs (835 patients) using an RFA; 1,174 limbs (954 patients) using a 1,470-nm wavelength diode laser with radial 2 rings fiber (1,470R); and 6,118 limbs (5,513 patients) using a 980-nm wavelength diode laser with bare-tip fiber (980B).

Results: The incidence of EHIT classes 2–3 was 2.7% following RFA procedure, 6.7% after 1470R, and 7.5% after 980B.

Conclusions: The incidence of EHIT following endovenous ablation was low, especially the RFA procedure. EHIT resolves within 2–4 weeks in most patients.

Prevalence and screening strategy for occult malignancy in acute first unprovoked deep vein thrombosis in Thai patients
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Background: Prevalence of cancer patients with deep vein thrombosis (DVT) was high in Thai patients. Unprovoked DVT may be the earliest sign of cancer so early detection of occult malignancy is mandatory. However, the prevalence and screening strategy of occult malignancy still unknown in Thai patients. In this study, prevalence of occult malignancy and screening strategy for occult cancer were evaluated.

Methods: Retrospective chart review of DVT patients at division of vascular surgery, Siriraj hospital from January 1st 2012 to December 31st, 2013 was performed. Demographic data and investigation to detect cancer were recorded.

Results: In 369 DVT patients, unprovoked DVT patients was 104 (28.2%), provoked DVT patients was 106 (28.7%) and cancer associated DVT was 159 (43.1%). In 104 unprovoked DVT patients, 26 patients (25%) had occult cancer. There were 6 (23.1%) gynecologic cancer, 4 (15.4%) colorectal cancer, 3 (11.5%) head neck breast cancer, 3 (11.5%) hepatopancreatico biliary cancer, 3 (11.5%) cancer of unknown origin, 2 (7.7%) urologic cancer, 2 (7.7%) soft tissue tumor cancer, 2 (7.7%) hematologic cancer, 1 (3.8%) lung cancer. Most of cancers (50.0%) were metastatic disease.

21 patients with occult malignancy (80.8%) were detected by history, physical examination, routine blood testing and chest x-ray before further investigations were performed. Three patients (11.5%) were diagnosed by abnormal screening tumor marker. Two patients (7.7%) were diagnosed by screening CT scan and mammogram.

Conclusions: Prevalence of occult malignancy in acute unprovoked DVT was 25%. Most of cancers were detected by a limited screening strategy including history taking, physical examination, routine blood testing, and chest radiography.

A novel approach to the treatment of chronic lower limb ulcers using bacteriotherapy
Miguel Angel Huaman Rios
Sanatorio del Milagro, Argentina

Background: Chronic ulcers are lesions in an inflammatory state with bacterial growth that produce biofilm. The latter prevents wound healing. Conventional treatment of chronic leg ulcers is unsatisfactory. The aim of this study is to show that Lactobacillus plantarum (Lp) can interfere in vivo and in vitro with pseudomonas aeruginosa (Pa) resulting in accelerated wound healing.

Objectives: Establish the effectiveness of the application of a culture of Lp in the resolution of chronic wounds.

Method: Fifty patients were studied from the Burns and Plastic Surgery Units in the Tucuman Hospital. The treatment consisted of a topical application of a culture of 5 by 105 Lp per ml on the wound for 10 consecutive days. The bacterial load decreased to 2.6 by 102 by day 10. This lead to 100% healing of wounds between 12.5cm2 to 60 cm2 in size. A 20% to 50% decrease in ulcer size was noted in lesions between 200cm2 to 1200cm2.

Results: Treatment with Lp showed similar efficacy to SSD in both study groups. Granulation, scarring and decreased bacterial load were measured comparing Lp and SSD. No significant difference between the two treatments was found.

Discussion: Based on these results, the easy preparation and low cost of Lp make bacteriotherapy a valid alternative for treatment of burns and chronic ulcer.
The real-time transthoracic echocardiography during Varithena injection
Mingli Li
Cardiovascular Surgery, China Medical University Hospital, Taichung, Taiwan

Background: Injectable 1% polidocanol endovenous microfoam (PEM), Varithena® (BTG International Ltd., UK) is a safe and effective modality to treat saphenofemoral trunk vein and lower leg varicose veins. The solubility of CO2 and absorbability of O2 by circulating RBCs after injection of this PEM have been confirmed. We detect real-veins. The solubility of CO2 and absorbability of O2 by circulating modality to treat saphenofemoral trunk vein and lower leg varicose veins. The solubility of CO2 and absorbability of O2 by circulating

Methods: All 3 patients were treated in supine position with ultrasound-guided access of greater saphenous vein distal to the SFJ with 2 to 3 intravenous catheters (18Gx1.88 IN, BD, Sandy, Utah, US) and butterfly needles (23G, JMS, Singapore). The leg was raised to a 45 degrees angle. Trunk vein and big branch varices were treated from proximal to distal. The PEM was constrained to the treated vein by manual compression at groin and vein segment distal to the injection site for 5-8 minutes until PEM stasis in the treated segment as confirmed by ultrasound. A maximum 15mL of Varithena® was injected in 5mL doses through preset catheters. Transthoracic echocardiography was monitored and recorded throughout the procedures for gas bubbles detected when groin compression was released to check for PEM stasis in the saphenous vein.

Interest of ultrasound and foam for sclerotherapy of telangiectases
Claudine Hamel-Desnos, Philippe Desnos
French Society of Phlebology (Société Française de Phlébologie), Paris, France

Background: As we know, in many cases, insufficient or no treatment of the underlying reflux of telangiectases (part of C1 of CEAP clinical classification) is the cause of matting. This preliminary procedure necessitates a precise anatomical knowledge of the structures that one examines, and a gradual learning of therapeutic procedures. Two anatomical structures must be known: the Perforating Artery PA and the Inter-Perforating Artery IPA in order to avoid the skin necrosis.

Methods: The objective of this presentation is to demonstrate the benefit of ultrasound and foam in sclerotherapy of telangiectases, especially for those located in the medial part of the lower limb. This presentation shows a clinical case with telangiectases located on the medial part of the knee and of the leg.

An ultrasound examination reveals that the sources that feed these telangiectases are a segmental reflux of the GSV trunk and its tributary. Then the refluxing veins are injected with foam sclerosant from top to bottom (GSV trunk first, tributary vein secondarily) under ultrasound guidance by direct puncture-injection with needle. An immediate ultrasound control shows the distribution of the foam in the target veins and in the telangiectases, since the foam is echoic like a contrast agent. Comcomitantly, the telangiectases become paler and there is no need to inject them directly during this sclerotherapy session.

In conclusion, this video shows that the benefits of ultrasound and foam in the C1 sclerotherapy treatment are similar to those observed and admitted for all varicose veins: identification of the sources of reflux, relevant and safe injection sites, limited injections, adequate doses and efficiency gain.

It is logical to think that, in the coming years, their use will be more frequent even in this indication.

Ultrasound-guided foam sclerotherapy with needle
Claudine Hamel-Desnos, Philippe Desnos
French Society of Phlebology (Société Française de Phlébologie), Paris, France

Background: Historically, ultrasound guided foam sclerotherapy (UGFS) using direct needle puncture-injection (DNPI) is the reference technique. However, it requires a specific training and skills. Some aspects will be developed: how the syringe and the probe are held, how to handle the syringe with one hand and how to coordinate both hands, how to act in a two-dimensional space, how to optimize the probe position, how to imagine the ultrasound beam...

Conclusions: This presentation could help to share experience and practice on the field of UGFS and enhance safety and efficacy of this technique.

Ultra Sound Guided Sclerotherapy of distal perforating vein must avoid injection into perforating artery and their superficial anastomosis the inter-perforating artery
Sammi Zerrouk
Sorbonne-University UPMC Paris VI, Paris, France

Background: The sclerotherapy of pathologic perforating vein is feasible and advantageous method in certain situations, provided that one recognizes the good indications and considers the safety of the patient. The photos and videos will show how the authors do this technique. Some aspects will be developed: how the syringe and the probe are held, how to handle the syringe with one hand and how to coordinate both hands, how to act in a two-dimensional space, how to optimize the probe position, how to imagine the ultrasound beam...

Conclusions: This presentation could help to share experience and practice on the field of UGFS and enhance safety and efficacy of this technique.
Hand rejuvenation: combining dorsal veins sclerotherapy and calcium hydroxyapatite filler injections
Adrian Lim1,2
1Dermatology, Royal North Shore Hospital, St. Leonards; 2uRepublic Cosmetic Dermatology & Veins, Sydney, Australia

Background: The hands are an important aesthetic feature that can reveal aging through surface pigmentary changes, loss of skin thickness and ectatic dorsal hand veins. Techniques addressing these changes already exist but are not routinely combined for optimum results. The presentation describes the combination techniques of dorsal hand veins sclerotherapy and sub-dermal filler injections.

Methods: The dorsal hand veins are treated with sclerotherapy (0.5% Sodium tetradecyl sulphate). This is then followed by subdermal injection of 0.75 ml-1.5 ml calcium hydroxyapatite (Radiesse) per hand, in conjunction with tumescent anaesthetic. The dorsal hands should be gently massaged for 2 minutes (per hand), twice a day for 2 days. If necessary, the procedure can be repeated after one month for further improvement.

The techniques of sclerotherapy and filler injections complement each other well in hand rejuvenation. Calcium hydroxyapatite (Radiesse) is safe and effective for hands and associated with high patient satisfaction. In suitable patients, the reduction in ectatic veins from sclerotherapy results in a longstanding improvement that complements volume restoration with fillers.

Sclerotherapy of reticular veins and telangiectasia with sclerosing agents in foam form
Matthieu Josnin
Vascular Medicine Unit, Saint Charles Clinic, La Roche sur Yon, France

Background: Reticular veins and telangiectasia are classified C1. Sclerotherapy is considered superior to laser treatment in this indication and has a high grade of recommendation for C1 (grade 1A, European guidelines for sclerotherapy in chronic venous disorders). As a result, for the treatment of C1, in contrast to the recommendations of sclerotherapy for all other varicose veins, liquid sclerotherapy is still considered to be the method of choice (grade 1A), with foam sclerotherapy as an additional option (grade 2B).

The two sclerosing agents which can be used in the form of foam are marketed in France as polidocanol (POL) or Laurromacrogol 400 and sodium tetradecyl sulphate (TDS).

Methods: This video is about the use of these two sclerosing agents in the foam form in the treatment of reticular veins and telangiectasia. The first part of the video is about how to prepare the sclerosing agents (dose, dilution...), and then the video shows some short examples of treatment of reticular veins and telangiectasia with the foam form.

Ultrasound guided foam sclerotherapy of the anterior accessory great saphenous vein
Pierre Ouvry
Cabinet Medical, Dieppe, France

Background: Foam-guided sclerotherapy is one of the most widely used techniques in the treatment of anterior accessory great saphenous vein. This technique is very effective in suppressing reflux, but has the reputation of exposing to a risk of pigmentation.

Methods: The video describes the technique by direct needle puncture, which is fast, safe and effective. It is possible to reduce the risk of pigmentation in the thigh.

Periorbital vein treatment with Nd:Yag long pulse laser
Matvei Parikov1, Ucha Dolidze2, Dmitry Slavin1, Ekaterina Gavva2
1Department of Dermatology, Innovative Vascular Center, St. Petersburg, 2Kazan State Medical Academy, Kazan, Russian Federation

Background: Periorbital unwanted veins are a common problem. Sclerosis more often uses for elimination of vein in this location but often there are bruises for 2 weeks and efficacy of 1 session achieves 60%. We try to use Nd:Yag 1064 nm laser for treatment of veins in this location.

Methods: We didn’t use local anesthetic due possible spasm. All procedures were done under cryo-cooling machine. Nd:Yag long pulse 1064 nm laser with spot 6 mm was used. Veins were treated with next parameters: fluence 120-150 J/cm2, impulse long 15 or 45 ms. Number of shots was 10-15. After spasm or discoloration of veins was applied hydrocortisone cream.

Burns was not founded. In 20 cases (83.3%) primary veins were occluded after 1 session. In 4 cases (16.7%) was performed effective Nd:Yag laser re-treatment. In 41.6% we found temporary swelling and easy tenderness during 2-7 days. The occluded vein was noticed during 2-4 weeks after session in 58.3% of cases. Transdermal laser treatment is a great alternative of sclerotherapy for periorbital cosmetic veins. There are no risks of serious complication such like necrosis tissue and thrombosis of corner eye vein.

CLaCS guided by augmented reality: how do I do it
Kasu Miyake, Marcelo Grill
Centro de Estudos Hiroshi Miyake, São Paulo, Brazil

Background: CLaCS is an acronym that stands for Cryo Laser and sclerotherapy. The technique aims to treat telangiectasias and its causative feeding veins. More than 20 countries are using CLaCS to treat aesthetic lesions in low CEAP cases or after functional treatment done by foam or phlebectomy or thermal ablation.

Methods: CLaCS is a synergy of transdermal laser, skin cooling and sclerotherapy with Dextrose 75%. CLaCS in steps: 1) Diagnosis: ultrasound imaging to spot all feeding veins and be sure that they are smaller than 1.5 mm in internal diameter by ultrasound and not connected to refluxing perforant and/or saphenous vein. 2) Augmented reality is used to perform photo-documentation and to guide CLaCS. 3) Transdermal laser is shot on the top of the telangiectasias and feeder veins. The energy set is lower than the factory settings. Lower energy but with more passes. 4) Injection sclerotherapy is performed right after the transdermal laser. 5) Cotton balls are placed with adhesive tape.

Percutaneous inverted saphenectomy
Kasu Miyake, Marcelo Grill
Centro de Estudos Hiroshi Miyake, São Paulo, Brazil

Background: Foam, thermal ablation and non-thermal endovenous treatments are the trend for saphenous vein reflux treatment. Even though, we believe that there are many situations where the extirpation a segment of the refluxing saphenous vein might be a good option. We
present a new idea for extirpating the saphenous veins by using the technolo-
gies that we have nowadays.

Methods: Duplex US is performed, and a percutaneous distal entry
point is chosen. With the use of local anesthesia and ultrasonographic
guidance, the GSV is punctured. An introducer sheath is placed into the
GSV. A hydrophobic guidewire is introduced into the sheath and ad-
vanced to the desired point where there is no reflux or another technique
is going to be used for treatment. Palpation and/or ultrasound imaging is
used to locate the guidewire and a small incision is made with blade 11.
The saphenous vein is cut and the proximal part is tied. A strong surgical
thread (SST) is tied on the distal part of the guidewire and towed into the
vein to be removed. The proximal part of the vein to be removed is tied
onto the SST. The SST is pulled from the distal entry point and the vein
starts to invert. The procedure is delicate and any tension indicates the
possibility of a tributary that will need to be cut and ligated.

Ultrasound guided regional anaesthetic techniques for use in
procedural phlebology of the lower limb
Nicholas Kemp
The Leg Vein Doctor, Toowong, Australia

Background: International guidelines for the management of vari-
cose veins now recommend the minimally invasive techniques of end-
ovenous thermal ablation and ultrasound guided sclerotherapy in place
of conventional surgery which involves high ligation and stripping of
the saphenous veins.

Minimally invasive techniques which be performed in an office based
environment obviate the need for hospitalization which is required for
invasive surgical procedures where general anaesthesia is necessary.
A number of ultrasound guided regional anaesthetic techniques are
available that can be easily employed to assist with the minimally inva-
sive techniques. Improvements in ultrasound technology with new high
frequency linear array transducers now enable easier visualization of
peripheral nerves.

Methods: The video presentation will provide a description of the
following ultrasound guided regional nerve blocks. 1. Femoral nerve
block; 2. Saphenous nerve block; 3. Genitofemoral nerve block; 4. Hi-
inguinal nerve block.

Laser hemorrhoidoplasty - technique and outcome
Arne Wilhelm1, Tomas Poskus2
1Center of Colrectal and Pelvic Floor Diseases, Cologne, Germany; 2Baltic
American Clinic, Vilnius, Lithuania

Background: Laserhemorrhoidoplasty (LHP) is a rather new minimal
invasive, non excisional treatment for prolapsing hemorrhoids grade
3-4°. We want to demonstrate the surgical technique and long term re-
sults in a large cohort.

Methods: Laser treatment was executed for each pile using a diode laser
with 8 watts of energy at a wavelength of 1470 nm and a pulse mode
of three seconds. A specific designed laser fiber with a sharp tip and a
controlled tissue radiation of 2-3 mm was used.

A painless Seldinger technique
Sebastien Gracia
Clinique de l’Atlantique, Puiiboreau, France

Background: During a thermal ablation, we need to create an access
to the saphenous vein to allow the insertion of the radiofrequency cath-
er or the laser fiber. This is called the Seldinger technique. Also, it is
not very painful, we could still improve the level of patient’s comfort
further.

Methods: Customarily, we use an anesthetic solution buffered with bi-
carbonate.
First, we make a little injection with a 25 Gauge needle to the place we
want to puncture the saphenous vein.
Then, we puncture the vein under DUS.
In the needle, we insert the guide.
The needle is pulled back.
Before putting in the introducer and the dilator we inject an anesthetic
solution along the guide with a 21 Gauge needle of 50 mm in length.
This will create a protective anesthetic cover around the vein and will
make the insertion of the introducer painless.

Real time, cloud based phlebologic documentation
Alexander Flor
Private Practice at Private Clinic Döbling Vienna, Wien, Austria

Background: Documentation is an indispensable but time consuming
part of our daily work.
For those who work scientifically, for those who collect special cases or
those who store a lot of aesthetic cases video and photodocumentation
is even more important.
Various programs have been developed to fulfill our wishes, in the end
many of these programs even are more time consuming than former
handwritten documentation.

Methods: In my presentation I want to give a short overview of our
Google Docs, and Dragon Medical based documentation system. Each
recorded ultrasound examination sequence can be looked at from every
PC, tablet or cellular Phone within the network eachtime and every-
where on the planet. No disk space is required. Videos can be stored
in endless capacity. Pre- and post pics are inserted automatically in the
patients’ medical history at the moment as they are taken.
At the moment we take a picture, it arises automatically and wireless on
a 4k HD screen.
Each coment you write might be seen on any other PC in realtime, every
written phrase you know who wrote it and on which device it was writ-
ten and at which time.
In a case of loss you can restore your data by inserting in the date before
it had got lost.
Documentation is saved for 35 years fulfilling requiremants of Medical
and Juridical standards.
Data protection is provided by a dual password system.
In my presentation I although want to refer to yo my experience with
Dragon Medical since 2011, a speech recognition solution designed for
physicians which has been integar leading electronic health records.
As we had some revolutionary advances in Phlebology since 2000 with
the introduction of endovascular techniques we observed also revolu-
tionary changes these days by the use of new cloud-based digital sys-
tems.

Retrograde ablation of great saphenous vein using inferior
epigastri vein as access vessel
Mark Whiteley, Charlotte Davies, Jaya Nemchand
The Whiteley Clinic, Guildford, United Kingdom

Background: Catheter based endovascular thermoablation (EVTA) is the
recommended treatment for truncal superficial venous reflux. During
How I treat the vein of Giacomini by endovenous laser
Neaume Nicolas
Société Française de Phlébologie, Toulouse, France

Background: The safety and effectiveness of endovenous laser treatment for varicose veins are evaluated for approximately fifteen years. The thigh extension branch, also known as the vein of Giacomini in many patients, may also contribute to venous pathology. Until now, there is no video about endovenous laser treatment of the Giacomini vein that has not been reported.

Methods: EVLA (1470 nm diode laser-radial fibre) was performed under local tumescent anesthesia. The refluxing vein of Giacomini was entered under ultrasound guidance. Tumescent anesthesia was administered under ultrasound guidance. The fiber was pulled back continuously at a rate corresponding to 80 J/cm (power setting 11 W)

Endovenous laser ablation with a 1470-nm wavelength is an effective and safe procedure for treating an incompetent vein of Giacomini.

Percutaneous valvuloplasty - A new modality to restore valve insufficiency
Johann Chris Ragg
Angioclinic Vein Centers, Berlin, Germany

Background: Percutaneous valvuloplasty may be applied in candidates with insufficient vein valves due to congestion or dilatation, as long as the cusps are intact and mobile. The method uses an ultrasound-guided periveneous injection of hyaluronan to achieve a long-term lumen reduction and potentially a restoration of the valve function. Several pilot studies, using different types of hyaluronan (small or large particles) have been successfully performed.

Methods: Treatment on tilt-table. Selection of the target region by ultrasound examination. Marking of the access point. Disinfection like for local surgery. Local anesthesia (<1 ml, e.g. lidocaine 2%). Charging of the injection tool with hyaluronan unto the tip to prevent air shadows. Penetration of skin and fascia. Then the tip of the injection instrument is switched to blunt to prevent incidental vein damage. Distribution of the hyaluronan around the valve segment until desired diameter is reached. Confirmation of hemodynamic result by raising the tilt table.

Negotiating tortuous great saphenous veins whilst performing endovenous thermal ablation
Shoaib Padaria
Jaslok Hospital, Mumbai, India

During Endovenous Thermal ablation using either laser fiber or a Radiofrequency catheter, the great saphenous vein is cannulated below the knee and a short sheath is introduced percutaneously, through which the relevant equipment is introduced up to the Saphenofemoral junction. Sometimes, the course of the LSV is markedly tortuous, or punctuated with many outpouchings along its length, which makes advancing the fiber very difficult, and in some instances impossible, necessitating multiple punctures along the length of the LSV.

Our video will demonstrate how we use a 0.035 inch Hydrophillic Terumo guide wire to negotiate the markedly tortuous veins, and then introduce a 5 French 45 inch long guide sheath into the vein, which is placed at the SF Junction. The laser fiber or the RFA catheter is then passed through this catheter, and both the elements are withdrawn simultaneously during the endovenous thermal procedure. The same technique can be used to close a very large tortuous dilated non-truncal varicose branch in the thigh.

How to deal with severe recurrent varicosities
Johann Chris Ragg
Angioclinic Vein Centers, Berlin, Germany

Background: Recurrent varicosities and their treatment are still a problem, although the tendency to quit surgery and to prefer endovascular techniques is quite clear. With the background of a large European clinic specialized in non-surgical therapy, techniques and strategies for different situations are shown.

Methods: Ultrasound detection of the entire pathology, including phlebography in selected cases (<10%). Local anesthesia. Multiple microcatheter access. Tumescent anesthesia in segments selected for thermal treatment (e.g. saphenous stumps). Perivenous saline or hyaluronan infiltration for the compression of large, non-superficial segments. Vein closure by combination of endovenous laser (810-1470nm), common microfoam and biomatrix sclerofoam, integrating means of target vein evacuation and deep vein flow acceleration.

Conclusions: With external compression, depending on target size and position, including film bandage and silicone pads.

The hydro-separation approach of sural nerve with controlled ultrasound-guided tumescent anaesthesia in endovenous laser therapy of small saphenous vein
Sammi Zerrouk
Sorbonne-University UPMC Paris VI, Paris, France

Background: Thermal Endovenous treatment is a minimally invasive technique for ablating the small saphenous vein (SSV). The goal of this technique is to obtain a permanent closure of SSV and to avoid complications like nerve injury. The sural nerve runs in proximity to SSV in the third distal of calf sometimes in close contact in the saphenous compartment. Besides the technical mastery, the tumescent volume needs to be controlled especially in certain patients with renal or cardiac insufficiency.

Methods: Step 1: Anaesthetic solution is injected first intra-dermally with small bleb in the repaired mark using a 30-gauge needle at regular intervals of 5 cm. Step 2: Linear transducer is placed perpendicularly (transverse) to ve-
How I do it: recurrence vein treatment of GSV with the 2-ring-laser (Biolitec)
Jens Alm

1Department of vascular surgery Dermatologikum Hamburg, Hamburg, Germany

Background: Recurrences after Babcock operations or thermal ablation procedures often result from too long-left Great Saphenous vein stumps. Their open revision operations are technically complex and burdensome for the patient. With the Radial-laser it is possible to treat these recurrences quickly and gently. Experiences from 5 years of application are reported.

Methods: In the period from June 1, 2011 to January 30, 2015, 502 patients were treated with vein recurrence in the junction after Babcock surgery or thermal catheter ablation. All interventions were done in ambulatory in short anesthesia. The lateral branches were treated in intervals by foam sclerotherapy. Insufficient and clinical relevant perforators, as well as straight refluxing venous sections, were treated in the same session with the catheter. Color duplex examinations were performed on the postoperative day, after 6 weeks, 6 days and annually. The impairment of pain was assessed by the visual analog scale (pain score). (1st day, 7th day, 6 weeks).

Results: Of the 502 patients treated, 490 patients could be re-examined. The occlusion rates were 92.6% after 1-7 days (N.=462), 91.2% after 6 weeks (N.=342) and 1 year after at 93,3% (N.=120), 2 years after (N.=57) at 91.2%. The foam-sclerosation of the lateral branches took place after 6 weeks. On the following day, all patients were able to follow their daily routine. An inability to work was not issued. Major and minor complications did not occur. The pain score was 1.0 on day 1, on day 7 0.5 and after 6 weeks on 0.

Conclusions: The Radial-laser is a gentle and safe treatment of veins stumps in the groin. Inpatient treatment and incapacity for work are no longer required. Due to the high degree of technical difficulties, the procedure should be performed only in designated centers with a rich experience in endovenous catheter techniques. The treatment of GSV recurrences will be shown by video.

Closure of a direct perforator vein by cannulation using a simple, inexpensive angiocath device and laser fiber
Shoaib Padaria
Jaslok Hospital, Mumbai, India

Larger incompetent perforator veins need to be closed when they are in the vicinity of or underlying a non-healing Varicose Ulcer. Surgical closure means incisions in already damaged skin, and can be very painful. We demonstrate whereby we can achieve direct, permanent closure of the Direct incompetent perforator with local anesthetic under ultrasound guidance. Our equipment consists of a 18 guage simple venous cannulation device (Angiocath) which is a needle with a plastic sheath.

The 600 micron laser fiber length is first measured so that only the tip extrudes from the tip of the Angiocath sheath. After giving local anesthesia to the skin, the Angiocath is inserted directly into the incompetent perforator under ultrasound guidance. The metal needle stylet is removed, and the laser fiber inserted. Generous amounts of Tumescent anesthesia is injected all around the angiocath sheath, and laser energy is delivered, achieving immediate and permanent closure of the incompetent perforator. The entire ablation procedure should take less than 3 minutes to complete.

Double tumescent anesthesia for a less painful thermal ablation of a saphenous vein
Sebastien Gracia
Clinique de l’Atlantique, Pullibour, France

Background: Local tumescent anesthesia is essential during a thermal ablation procedure with radiofrequency or laser. First, to protect surrounding tissues from thermal damage and then, to narrow the vein onto the laser fiber or the radiofrequency catheter promoting treatment uniformity. But this is also sometimes a painful moment for the patient. We are trying to find a solution to increase the patient’s comfort and lower the pain.

Methods: We choose to use a buffering solution with bicarbonate. Numerous trials have shown less pain when compared with saline solution non buffered. This helps us to lower the pain linked to the hydrodissection. However, it does not erase the pain caused by the punctures. Since last year, we have been applying a new type of local tumescent anesthesia. First, we inject a very superficial anesthesia (just below the skin) beginning close to the introducer of the saphenous vein. Then, we continue the local anesthesia a few centimeter away from the first puncture in a area already desensitized. We repeat this procedure at consecutive intervals along the entire vein. Consequently, the skin is entirely desensitized along the vein. Now, we can practice classic tumescent anesthesia around the vein in the interfascial compartment. The patient will not experience any additional pain because the skin is completely desensitized.

Conclusions: To conclude, the time and the quantity of anesthesia solution increase but the patient’s comfort is much improved and the pain has almost disappeared.

Closure of indirect perforator veins by closure of the draining superficial venous segment
Shoaib Padaria
Jaslok Hospital, Mumbai, India

Many a times it is seen that there are a bunch of incompetent perforator veins which are present just above the ankle, and all of them drain either into the distal Long Saphenous Vein or the Posterior accessary vein. In such cases which are associated with significant Lipodermatosclerosis, edema or non healing venous ulcer, it is imperative to close these perforator veins. A simple method of closing all of them together is to close the superficial venous segment into which they drain into. This can be achieved either by use of Laser or Radiofrequency ablation with use of generous use of Tumescent anesthesia. The video will demonstrate the ease and simplicity of closure of the superficial segments, and the subsequent ultrasound showing abolition of reflux in all the draining incompetent perforator veins.
Pelvic congestion syndrome treatment

Larysa Chernukha¹, Vadim Kondratyuk², Olena Vlasenko², Alla Guch³, Alla Bobrova³
¹Major Vessels Department; ²Department of Angiography and Endovascular Surgery; ³Department of Radiation and Functional Diagnostics, SI Institute of Surgery and Transplantology named after O.O. Shalimov, Kyiv, Ukraine

Background: Pelvic congestion syndrome (PCS) is associated with chronic pelvic pain, pelvic varices and pelvic venous hypertension. We have an experience of examination and treatment of 27 women with PCS. Combination of PCS and varicose veins of lower extremities was found in 12 women (54.5%). The aim of our study was to improve treatment results in 27 women aged 29-38 years (median 33.5 years) with PCS by eliminating the cause of disease in pelvis and venous outflow correction of the lower extremities.

Methods: Patients underwent an ultrasound examination (US) of the lower extremities, transvaginal ultrasound (TUS), selective angiography and computer tomography (CT) on indication. Obstructing anomalies (signs of Nutcracker phenomenon or May-Thurner syndrome) were excluded.

Results: The main diagnostic method was selective angiography with iohexol 350. Embolization with aetoxisclerol 3% 8-10 ml foam, Gianturco coils (Cook) was made in 22 patients. We have performed endovenous laser ablation of ovarian vein in 2 patient using a 1470 nm diode laser (radial 2 ring fiber) and radiofrequency ablation of ovarian vein in 3 patients.

Methods: We believe that endovenous procedures may be used for treatment of PCS. First results of endovenous procedures are encouraging.

Cryостripping for SSV incompetent: in special case

Jinwon Jeon
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Background: There are various methods for treatment of SSV incompetent. They have both advantage and disadvantages. So surgeon must consider the reflux range, anatomical relationship, diameter of SSV and cost effectiveness. But in case of extended reflux of SSV (below the mid-calf) and large diameter of SSV (>10 mm) more consideration is needed. Cosmetic problems and pain, nerve and vessel injury can be occurred during conventional stripping, numbness and recanalization can be occurred during endovascular ablation.

The purpose of this study is to showing the efficacy and safety of cryo-stripping by minimal incision on popliteal fossa.

No major complication was seen. (mild numbness 4, neovascularization near the SPJ 2).

Cryostripping have no chance recanalization and less traumatic than other modality.

Methods: Patients diagnosed with only SSV incompetent and treated with cryo-stripping between July 2014 and June 2016 were enrolled in this study. (70 patients with 98 limbs) they have reflux from SPJ to under mid-calf level and the diameter of SSV on mid-level was larger than 10mm.

Small incision is made (about 0.5 cm) on popliteal fossa along the skin crease, near the SPJ in supine position. next, SSV in picked up with sonoguide needle pucture. proximal strump is double ligated and cryo-probe is advanced to the level of reflux distally. After indentification of sural nerve, regardless of indentification, tumescent solution is inserted around the SSV to operate sural nerve from SSV. (about 1 cm of halo). and then stripping is followed.

Building the vascular services center of excellence Airlangga University Hospital, Indonesia

Niko A. Hidayat, Zulfayandi Pawans
Cardiothoracic & Vascular Surgery, Universitas Airlangga Hospital, Surabaya, Indonesia

Background: Being the Center of Excellence, Airlangga University Hospital is one of the essential initiative project empowering the Dreams and Hope of The Universitas Airlangga, as the World Class University in the near future.

One of the Feasible project is The Vascular Services in The Airlangga University Hospital.

Methods: We planned and underwent our project to empower the project programs, by the educations, services and also research of Vascular Surgery topics in the Airlangga University Hospital.

Endovenous laser ablation 1470/1560 nm with high leed, radial fibers, automatic pull back and laser power meter

Dmitry Slavin¹, Matvey Parikov², Ilsear Shamsutdinov³, Alexander Chugunov¹
¹Kazan State Medical Academy, Kazan; ²Innovative Vascular Center, Saint-Petersburg, Russian Federation

Background: Linear endovenous energy density (LEED) is the most important factor influencing the success of endovenous laser ablation (EVLA) of saphenous veins.

Methods: From 2015 we used high LEED treatment protocol 85-200 J/cm (mean 105,1) on 1820 consecutive patients, C2-C6. GSV 67,4% (extrafascial segments 15,9%), SSV 15,4%, AASV 9,1%, GSV+SSV 4,5%, GSV+AASV 5,6%. EVLA was performed on an ambulatory basis with tumescent anesthesia, diode lasers 1470/1560 nm, radial fibers, automatic fiber pull-back speed 0,7-0,5 mm/sec. Before each procedure we performed measuring of the real laser power at the fiber tip with “Optir” power meter. Ultrasound imaging was performed on the 1st, 7th, 14th day and 6 months after EVLA.

Results: We achieved primary occlusion of saphenous veins in 100% of patients. We observed a very low incidence of recanalizations after 6 months, only in 2 patients. “Optir” power meter in some cases revealed significant decreasing of laser power due to diode laser or fiber. Only 6% of the patients took analgesics on the first day after EVLA. Endothermal heat induced thrombosis was revealed in 1,1% of patients in first two weeks: EHT II – 0,6%, EHT III – 0,5%.

Conclusions: EVLA 1470/1560 nm with high LEED, radial fibers, automatic pull back and laser power meter is a highly effective, safe and painless procedure.

The Gan gutsers - optimising set up in endovascular interventions

Jason Diab, John Gan
Vascular Surgery, Port Macquarie Base Hospital, Sydney, Australia

Background: There is great interest in the ways to mitigate surgical complications. Of these, staff error and surgical site infections often pose important factors in the set up of the patient. Non technical skills for trainees in preparation, communication and decision making are fundamental to the flow in theatre. Trainees can benefit from these skills by implementing a simple set up in procedures that have the potential spillage or risk of contaminating the wound. The Gan gutsers is a simple but
effective set up for these procedures, such as endovascular intervention or laparotomies, whereby surgical drapes are folded into implanted gutters along the sides of the patient. The notion of this double river bedded gutter acts to allow spillage to safely slide down the opposite end reducing the risk of surgical contamination to the wound. It also acts as a safety barrier to reduce the risk of contaminants and bodily products directly onto the theatre staff. The implementation of this novel idea into our surgical practices has aided to increased non technical surgical skills in preparation and communication for trainees. It also has helped reduced the spillage and contaminants in larger cases that could potentially cross contaminate. The trainees have found this as a novel idea that can be implemented safely into other areas of surgical practice for surgical and patient safety.

Methods: The patient is surgically prepped in the standard fashion as per local protocol. Once the surgical drapes have been placed over the surgical site, for instance the abdomen, the right flank drape is folded about a hand breadth below the axilla from bottom to top forming a U shaped gutter. This is secured with a surgical clip. The farther end of the drape at the iliac crest is similarly folded about one and half hand breadths from bottom to top forming a U shaped gutter. This is secured with a surgical clip. The right side U shaped gutter should be sloping downwards to encourage flow of spillage. The procedure is similarly performed in the same fashion on the left hand side using surgical clips.

It is a good idea to just cover the varicose vein or ulcer with a tattoo?
Victor Canata, Roberto Corbetta, Victor Canata
Sala X Primera Catedra de Clinica Quirurgica Paraguay, Universidad Nacional de Asuncion Paraguay, Asuncion, Paraguay

Background: Tattoos just cover the unsightly veins, rather than fixing the problem. It’s literally a cover-up, the result is not always pleasing, and may worsen over time, especially if the vein itself is pierced, most important, you need to be sure your spider and varicose veins are simply a cosmetic problem. The appearance of spider and varicose veins is your body’s way of indicating that blood is not flowing completely from your legs back to your heart. The pooling of blood, a result of vein valves im

Methods: Tattooing is a unique body modification technique that injects ink into layers of the skin using a special needle attached to a rotary or coil machine. This process creates permanent designs in the skin that can only be removed by a high-powered laser skin-resurfacing device. Tattoos often have a cultural significance or meaning to them, which is why getting one can be a very tough, yet personal decision. We present here a case of a varicose vein ulcer cover by a tattoo of a mermaid all over the leg the ulcer were treated under laser ablation with excellent cosmetic and surgical result.

Thrombectomy followed by a foam injection, after saphenous vein thermal ablation
Claudine Hamel-Desnos, Philippe Desnos
French Society of Phlebology (Société Française de Phlébologie), Paris, France

Background: Thrombectomies of the GSV can be performed after thermal ablation even though they are less frequent than thrombectomies of varicose veins after sclerotherapy. They could reduce the risk of cutaneous hyperpigmentation.

Methods: The objectives of this presentation are to show:
- How the authors perform a thrombectomy of a GSV under ultrasound (US) guidance
- The possibility of injecting foam in the GSV after the removal of blood. The presentation will develop the different steps of a thrombectomy done under US guidance: criteria of decision to perform it and when, how to choose the site of puncture, how to choose the needle and how to guide it in the vein…
- Then the video will show the injection of foam following the thrombec-
tomy at a hand breadth below the axilla from bottom to top forming a U shaped gutter. This is secured with a surgical clip. The farther end of the drape at the iliac crest is similarly folded about one and half hand breadths from bottom to top forming a U shaped gutter. This is secured with a surgical clip. The right side U shaped gutter should be sloping downwards to encourage flow of spillage. The procedure is similarly performed in the same fashion on the left hand side using surgical clips.

Hybrid approach to AVM: how I do it
Ravul Jindal, Navjot Kaur, Piyush Chaudhary
Vascular Surgery, Fortis Hospital, Mohali, India

Background: Arteriovenous malformation (AVM) treatment can be very challenging. Various techniques and approaches have been used in past. We use Hybrid approach to treat AVM, which gives very good result.

Methods: Preoperative radiological investigation gives a fair idea about planning your treatment. Endovascular approach is used to reach the nidus of the malformation and to embolize it with ONYX or alcohol. Also percutaneous approach is used to stop venous outflow with glue or onyx. All AVMs which were embolized with hybrid approach, required lesser number of sittings to completely embolize the AVM compared to only endovascular embolization. Better closure was seen with the hybrid approach. Hybrid approach to treat AVMs give better result.

From phlebectomy to microphlebectomy
Arnold Kadiss
Phlebological dep, Dr. Maurins Vein Clinic, Riga, Latvia

Background: Vein problems and vein removal are very actual from ancient time till now. Long and traumatic incisions during phlebectomy leads to big scars, neovaricosity. Nerves and mainly lymphatic vessels damage are often seen after vein operations. Extensive pain after long incisions also influences life quality after phlebectomy.

Methods: The presention and film deals with development from phlebectomy through incisions 3-5 cm and more to miniphlebectomy 5 mm and less and microphlebectomy 1 mm and less at the present time. Prac-
tical aspects of operation will be shown. Film will cover also tips and tricks. Possible problems will be discussed during presention.

Cyanoacrylate adhesive ablation - video presentation
Nick Morrison
Morrison Vein Institute, Tempe, United States

Background: The novel cyanoacrylate ablation procedure has been shown to be as safe and effective as RF ablation. This video will present the procedure in detail.

Methods: This video presentation will describe the procedures of cy-
oacrylate adhesive ablation in detail with narration by the operating surgeon. Tips and tricks will also be described.
Endovascular treatment the incompetent middle-thigh perforating vein with great saphenous vein preservation

Dmitrii Rosukhovskii1, Oleg Shonov2
1The Department of Physiology of Visceral Systems, Institute of Experimental Medicine, 2Private Clinic “Medalp”, St. Petersburg, Russian Federation

Background: The incompetent middle-thigh perforating vein (MTPV) is a frequent source of varicose veins in the great saphenous vein (GSV) system without saphenofemoral reflux. The incompetent MTPV often falls into GSV from the back side perpendicular as a direct perforator between GSV and femoral vein. Surgical ligation of MTPVs is complicated and requires a large incision. The endovenous laser ablation (EVLA) usually held for a secondary incompetent segment of GSV, but the residual MTPV in some cases becomes the cause of recurrences.

Methods: To preserve competent GSVs we perform selective catheterization and EVLA of the incompetent MTPV. If the portion of MTPV has a straight part (at least 3 cm) running parallel to GSV, we perform a catheterization of this segment. In the case of perpendicular falling of MTPV from the back side of GSV with a short portion (directly to its confluence with a femoral vein) or tortuous MTPV (without straight sections), the only way to place the catheter into MTPV is to pierce through GSV with a perpendicular puncture above MTPV ostium. After the penetration into GSV lumen, you pulling back the needle on 2mm inside the plastic intravenous catheter. After that, the end of the catheter is softly placed into the ostium of MTPV. A slim radial or bare-type fiber can be applied. Local tumescent anesthesia is carried out by an introduction of 20 mL of 0.05% solution lidocaine. EVLA is performed with the 1470nm laser, 7 W and manual traction speed of 1 mm/s or slower. The laser is switched off at 5mm before GSV. Ultrasound control during pulling back allow avoiding thermal obliteration of GSV. The operation takes about 5 minutes. The next day, the GSV pathological reflux usually doesn’t detect during the functional tests. Additional studies are needed to assess the long-term results of such GSV preserving treatment.

Ilio-caval obstruction stenting: results of 100 consecutive limbs

Patrik J. Tosenovsky
Royal Perth Hospital, Department of Vascular and Endovascular Surgery, Curtin University School of Medicine, WA, Australia

Background: We present results of 100 consecutive cases of iliocaval obstruction treated with surgical intervention collected over the last 5 years. The group consists of both thrombotic and non-thrombotic obstructions, chronic, acute and subacute cases. Most frequently performed intervention was an endovascular repair by angioplasty and stenting and also femoral vein endohlebectomy with or without arterio-venous fistula, thrombolysis of acute and subacute DVT affecting iliofemoral veins or IVC.

Methods: We present overall stent patency, failure rates, complications and revascularization effect on symptoms recorded.

Foam sclerotherapy – the ‘English Method’

Philip Coleridge-Smith
The British Vein Institute, London, United Kingdom

The treatment of varicose veins with foam sclerotherapy has become widespread. The technique was originally published by Juan Cabrera in 1995. Cabrera’s technique necessitated the injection of large volumes of foam. The current licensing of sclerosant foams indicates that limiting the maximum injected volume to about 16 mL which leads to reduced efficacy of treatment. This presentation shows a method which has been developed in the UK in order to overcome the limitations of foam sclerotherapy with small volumes of foamed sclerosant.
Leg varicose veins of pelvic origin: venographic mapping of venous escape point
Eluned Davis, Judy Holdstock, Previn Diwakar, Jaya Nemchand, Mark Whiteley
The Whiteley Clinic, Guildford, United Kingdom

Background: Venography and duplex ultrasound are commonly used in phlebology to diagnose and treat venous diseases. Transvaginal duplex ultrasound has been shown to be the gold standard technique for assessing the haemodynamics of the pelvic veins. We use it to assess the pelvic veins in patients with varices coming from the pelvis and communicating with leg varices, those who complain of labial or perineal varices or those who have pelvic congestion symptoms. During transvaginal ultrasound scanning, we can assess the ovarian veins, arcuate veins and internal iliac veins and can demonstrate reflux in these with duplex ultrasound, if it is present. A full diagnostic picture of the pelvic and legs veins is created which is used for pelvic vein coil embolisation procedure (PVE).

Methods: During PVE, a catheter is passed through the jugular vein, through the Inferior Vena Cava (IVC) and into the pelvic veins. Contrast is injected to create a vein map to show where a coil should be deployed. In the subtraction venogram below, the catheter is situated in the right obturator vein, and after injection of contrast, the pelvic varices are seen communicating with the superficial leg varices. This venogram was taken on a patient who was diagnosed with pelvic vein reflux using transvaginal duplex ultrasound. This venogram image was taken during her subsequent PVE. It perfectly demonstrates pelvic varices leading onto leg varices, and hence why pelvic vein reflux must be considered in those with varices seen communicating between the pelvis and legs.

Description: Subtraction venogram showing the catheter placed into the right obturator vein with contrast injected. Communication between the pelvic veins and leg veins are clearly demonstrated in this image.

Full body augmented reality lightpainting. Thigh veins below resilient telangiectasias: are they feeding causative veins or just normal veins?
Kasuo Miyake
Centro de Estudos Hiroshi Miyake, São Paulo, Brazil

Description: A 36 yo patient complaining about telangiectasias, mostly on the lateral part of the thighs. She reported that the legs appearance affects significantly her quality of life because she lives in a warm country. Ultrasonic examination diagnosed reflux on both great saphenous veins and left small saphenous vein. Patient was positioned in a treating bed covered with a black sheet. All walls, the augmented reality device were covered in black and augmented reality operator was wearing black clothes including hood and gloves. A Canon 5D Mark IV with sensor CMOS 31MP and Canon Lens L Series 28-70mm 2.8f was used. The camera was placed on a tripod. Room was almost completely dark and the shutter remained opened for 20-30 seconds while the patient was painted continuously with augmented reality images. The resulting image is from one single photograph. The photograph conformed to the guidelines of the 1975 Declaration of Helsinki and was approved by our institutional ethics review board.

Discussion: Resilient telangiectasias can be the cause of diminished quality of life, mostly in women from tropical and subtropical countries. To achieve the best result in any field, a thorough examination is imperative. Modern devices like duplex ultrasound and augmented reality can spot veins below telangiectasias. It is controversial but we believe that those veins are feeding veins and we treat them with CLaCS, phlebectomy or endovenous laser. Many countries have regulatory rules that impede ultrasound examination in asymptomatic patients. We work in a private clinic and we perform ultrasound and augmented reality examination in all patients. From our records, 33% of our asymptomatic patients have reflux on the saphenous vein. The objective of this art-photography is to stimulate the discussion of the importance of diagnosis and study of the feeder veins. The Controversy: To Treat Or Not To Treat? Our answer is YES! We Perform CLaCS on the feeder veins and telangiectasias. We clac those veins if they are smaller than 1.5 mm (internal diameter by ultrasound in upright position) and we perform endovenous laser or ligation if the feeder veins are connected to axial reflux. Photograph by Ivan Berger and Lightpainting by Kasuo Miyake.

Leg varicose veins of pelvic origin: venographic mapping of venous escape point
Eluned Davis, Judy Holdstock, Previn Diwakar, Jaya Nemchand, Mark Whiteley
The Whiteley Clinic, Guildford, United Kingdom

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Advantages of foam for C1 (reticular veins and telangiectasias)
Claudine Hamel-Desnos

According to the European guidelines, foam sclerotherapy (FS) is a valid option for reticular veins and telangiectases (C1 of CEAP clinical classification). The advantages found for FS of C1 are those encountered for C2: better efficacy, less sclerosant, limited injections and fewer sessions, foam well visible in the vein by the naked eye or by ultrasound. Insufficient or no treatment of the underlying reflux of telangiectases is the cause of matting. Consequently, the pre-treatment assessment should include a clinical examination as well as an ultrasound imaging examination. Thanks to the improvement of ultrasound probe technology, it is now possible to use ultrasound guidance for sclerotherapy of small veins, even if the diameter is only 1 mm, when those veins are not well visible under the skin (depth>2 mm). Then an immediate ultrasound control shows the distribution of the foam in the C1, since the foam is echoic.

Finally, FS can be used for C1 in the same way as for any type of varicose vein, but so far there is no evidence of the superiority of the foam on the liquid for C1, in the literature. Since the foam is stronger than the liquid, concentrations must be adapted to prevent inflammation and matting. FS is suspected of causing more visual disturbances for C1 than for C2, but analysis of the studies fails to confirm this hypothesis. In conclusion, it is logical to think that, in the coming years, FS for C1 will continue to develop, but RCTs are still missing.

PFO: an update. Do we need to worry about it?
Pauline Raymond Martinbeau

**Background:** A relationship between neurological adverse events after varicose vein treatment and a patent foramen ovale (PFO), has been implied.

**Objectives:** In this prospective observational study, we evaluated whether there is enough evidence to test all patients for right-to-left shunt prior to varicose vein treatment.

**Methods:** We did a literature search between 1947 and 2017 to review published neurological events and disturbances reported after varicose vein treatment. We identified 1,039 articles in which 45 studies were of interest. We reviewed 11,239 patients who underwent varicose vein treatment.

**Results:** In post-sclerotherapy we identified thirteen cases of stroke (0.01%), (4 with liquid and 12 with foam), seven cases of TIA and RIND (0.06%), (2 with liquid and 5 with foam) and 142 cases of visual disturbances and migraine (1.26%). In post-thermal ablation, we identified 2 cases of air embolism.

**Conclusions:** Neurological adverse events are rare after varicose vein treatment and the relationship with PFO has not been established in all studied cases. Pre-treatment testing for right-to-left shunt is not warranted for people without symptoms. Further research is needed.

Technical comparison of various sclerotherapy methods
Claudine Hamel-Desnos

Thanks to Pravaz who invented the hollow needle in 1851, the first sclerotherapy method was the direct puncture with a needle.

In 1928, Tournay elaborated the top-down technique (French school) which consists in treating firstly the highest or largest leakage points. The injections are fractionated and staged and no compression is applied. The tributary varices are only injected at a later time, if necessary. In the same period, with the 2 distal techniques by Sigg and Fegan compression was systematically applied because inflammation was much more frequent; both have currently been abandoned.

Personality types and patient selection: what should we look out for?
Louis Grondin

Carl Jung, in his book Psychological Types, initially described eight types of human personalities, according to their preferred behavior (extraversion/introversion), and their preferred method of perceiving and interacting with the world (sensing/intuition; thinking/feeling; and judging/perceiving). Building upon Jung’s dichotomies, Isabel Briggs-Myers developed in 1962 the MBTI tool which has been administered to millions of people worldwide as a tool for team building, leadership, coaching, conflict management, career development, and more importantly a predictable response to stress. Studies have shown that treatment outcomes are profoundly influenced by underlying personality types. Outcome oriented medical prudence would favor giving attention to personality types (especially D-personalities) and their known response to disease, success and failure.

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**Conclusions:** Neurological adverse events are rare after varicose vein treatment and the relationship with PFO has not been established in all studied cases. Pre-treatment testing for right-to-left shunt is not warranted for people without symptoms. Further research is needed.
Nowadays, the Top-Down technique is the reference (European guidelines). However, some variants exist.
In the English technique, short cannulas are placed along the thigh and sometimes the leg, and then the foam is injected from place to place starting from the most proximal cannula.
Another variant is the use of a long catheter, with or without tumescent infusion around the vein. The tip of the catheter is placed just below the saphenofemoral junction and then slowly withdrawn during injection of the foam.

Another method, which is not really consistent with the top-down technique, is to place a short cannula in the knee area and inject all the foam from this site.
The “classical French technique” seems to be simpler and faster than the others and no compression is necessary. However, this requires more training and experience.
So far, regarding the literature, there is no evidence that any of the techniques leads to better results compared with others.
PELVIC OVARIAN AND VULVAR VEINS

Treatment algorithm for pelvic reflux
Antonios Gasparis

Pelvic reflux can present clinically as either pelvic congestion syndrome (PCS), symptomatic non-saphenous varicose veins of the lower extremities or both. Diagnosis relies on clinical symptoms and pelvic imaging. Duplex ultrasound (trans-abdominal) allows complete evaluation of the gonadal veins, peritumoral veins and the renal/iliac veins for compression. The underlying pathology is ovarian vein reflux in the majority of patients with some patients having compression as the underlying pathology. Patient with PCS and pelvic reflux can be treated with pelvic embolization from within the pelvis. Patients with predominantly lower extremity symptoms and non-saphenous vein from a pelvic origin would benefit from treatment of the varicose veins first and re-evaluation. Patient with persistent leg symptoms or recurrence would benefit by addressing the pelvic reflux. The above algorithm is based on personal experience as there is limited prospective data available.

Treating ovarian veins with laser and glue ablation
Larysa Chernukha
SI Institute of Surgery and Transplantology, Ukraine

Pelvic congestion syndrome PCS is a condition that results from retrograde flow through incompetent valves in ovarian veins. With the valve’s incompetence of ovarian vein it is not always possible to stop completely the reflux (due to the «blurring» of the contrast, insufficient occlusion efficiency of coils) that cause the recanalization, which can lead to the clinical recurrence of pain. The leading moment which limits using of endovasal methods in analogy with treatment of varicose veins of lower limbs is impossibility of using tumescent anesthesia in PCS treatment. In experiment on 10 rabbits the influence of RFA and laser ablation on venous wall and surrounding tissues without tumescent anesthesia was studied. According to experimental data changes were fixed only in ablated vessel walls, in surrounding lipid and muscular tissues dystrophic changes were observed. We had 28 pts with PCS. The average age was 25 years (12-37). Imaging - transvaginal duplex ultrasound, venography, CT, MRI. 20 pts were performing ovarian vein embolization (17 unilateral, 3 - bilateral) with sclerosing agent and coils. 8 pts - endovenous ablation. (5 - laser ablation with double-ring radial fiber (Biolitec) 3 – RFA (Medtronic). Endovenous ablation we combined with distal sclerotheraphy (Polidocanol 3%) in foam form. Technique of the procedure is shown in the presentation movie (3 min). It is very important to be careful during performing of the procedure in the crossing region of ovarian vein with ureter. According to US and venography control after 12 months in 5 patients after used endovasal methods ovarian vein is not visualized.

Patterns of pelvic venous duplex findings in patients who present with varicose veins
David Huber
Vascular Care Centre, Wollongong, Australia

Three hundred and thirteen patients with varicose veins, who presented for duplex ultrasound, had an abdominal and pelvic duplex scan. The aim was to assess the patterns of venous findings including iliac venous compression, left renal vein compression, ovarian vein incompetence and internal iliac vein incompetence. The age distribution, incidence and relationship between findings will be discussed.

Proposal for a clinical score of pelvic congestion syndrome and its validation
Pier Luigi Antignani
Director, Vascular Center, Nuova Villa Claudia – Rome – Italy

Pelvic congestion syndrome (PCS) is one of possible cause of chronic pelvic pain in women. PCS is described as chronic pelvic pain (CPP) arising from dilated and refluxing incompetent pelvic veins. The diagnosis is based on patient-reported symptoms, clinical examination, anatomical features, duplex scanner ultrasound and magnetic resonance examinations and venographic findings. There are no generally accepted, well-defined clinical criteria for the diagnosis of PCS. The identification of incompetent pelvic veins is essential for the diagnosis of PCS. Non-invasive methods such as ultrasound and magnetic resonance imaging are the first line of investigation, with assessment of the blood velocity and flow pattern. We suggest a simple score system to identify the clinical symptoms and signs and the non invasive diagnostic (transvaginal ultrasound and magnetic resonance) data. The maximum clinical score is 27 (9 signs and symptoms with values from 0 to 3: chronic pelvic pain, dyspareunia, vulval/perineal varices, atypical leg varices, dysmenorrhea, vulval congestion, haemorrhoids, premenstrual and menstrual varices pain, sudden urination) and the instrumental score is 10 (1 point for each 10 venous district). The most common ultrasound criteria are: Tortuous pelvic veins with a diameter of greater than 6 mm. Mean diameter in PCS ~8 mm. Slow blood flow <3 cm/second or reversed caudal flow in the left ovarian vein demonstrated by Doppler waveforms. Dilated arcuate veins in the myometrium that communicate between the bilateral pelvic varicose veins.

Treatment with foam sclerotherapy: advantages and limits
Lorenzo Tessari
Bassi Foundation, Peschiera Del Garda Verona, Italy

Background: Pelvic congestion syndrome is a recently recognized clinical problem due to pelvic vein insufficiency. Sometimes, propagation of venous reflux into the lower extremities causes varicose veins and chronic venous disease (CVD). The present author proposes a different approach to the treatment of these points of reflux, above all with regard to point P, through the injection of sclerosant foam with colour-duplex ultrasound guide.

Methods: 647 consecutive women patients, affected by CVD of the lower limbs, underwent both clinical and colour duplex investigation, demonstrating in 95 women (age 32-66 years) venous reflux from the
Conclusions: Our experience demonstrates that in the case of pelvic varicocele with escape points towards the lower limbs, ultrasound guided foam sclerotherapy may represent a first choice method, thanks to its safety and efficacy which is achievable after a short learning curve. Ultrasound-guided foam sclerotherapy, in the short term, seems to be both effective and minimally invasive for treating such an atypical albeit frequent pattern of reflux in women. Further research will be necessary in order to validate this technique in the long term.

Results: The average follow-up lasted 24 months. No minor nor major complications have been reported. Reflux through the Alcock channel vein as well as the connected varicose veins disappeared in the treated area entirely.
In 2014, a new prototype system of foam fabrication, showing superiority in front of Tessari’s method, was presented at EVF Paris. For two years, a multidisciplinary team has worked to develop a standardized pre-industrial device.

**R&D Objectives:** To demonstrate the feasibility of obtaining a stable foam from different concentrations of Aethoxisclerol (AES) with a standardized system using an automated agitation system and a disposable container. Different container prototypes were designed by a technology engineering centre to optimize all relevant parameters (shape, volume, materials, agitation speed, time, foam retrieval) targeting optimal foam quality with single-use, disposable units. Inside the container, there is a piece which rotates upon activation of the agitator system. We tested 0.20%, 0.5%, 1% and 3% (AES) with a 70/30% mixture of O2/CO2 and we also tested atmospheric air. 10 cc Latex free syringes were used to extract the foam. The method consists of a magnetic stirrer with adjustable speeds on which we place a sterile container. The agitator system automatically drew the required gas, from the available volume, to form the foam. Interim results with pre-industrial prototypes have been successful. We are currently awaiting results on final experiments with the final product. Physical characteristics and measurements are scheduled to conclude in Q1 2018.

**Conclusions:** This device is useful for the automatic fabrication of AES foams. This system is useful in manufacturing foam with air as well as with O2/CO2 and offers standardization of parameters for a broad type of foams indicated for all types of varicose veins.
RECURRENT DVT

Recurrent VTE: an overview
Andrew Nicolaides

The incidence of recurrent VTE after cessation of anticoagulation therapy in patients with unprovoked DVT is 11% at one year and 30% at 5 years. At approximately 3 years the risk of recurrence is equal to the risk of serious bleeding when vitamin K antagonists are used. Therefore, identification of those likely to bleed and those at increased risk of recurrence is essential in formulating appropriate preventive strategies for extended prophylaxis.

Residual thrombus ≥40% of the vein diameter or elevated D-dimer during the first 3 months after cessation of anticoagulation are markers of increased risk of recurrence. Alternatively, the Vienna nomogram can be used to classify patients into annual risk of recurrence: low (<2.5%), moderate (2.5-10%) or high (>10%). Patients can also be classified into low, moderate and high risk of bleeding based on validated criteria. Randomised placebo controlled trials have now demonstrated that extended prophylaxis with dabigatran or rivaroxaban can reduce the risk of recurrence by 75-80%, but the risk of major or clinically relevant non-major bleeding remains high (6% per year). In contrast, apixaban and sulodexide reduce the risk of recurrence by 80% and 50% respectively without increased bleeding compared with the placebo.

Thus, based on calculation of risks and the use of risk markers, a number of strategies have now become available that can minimise both VTE recurrence and bleeding. Future studies should demonstrate which of the available strategies would prove most effective.

ACCP Guidelines on recurrent VTE
Clive Kearon

First, confirm that there truly has been a recurrence; many such reports are false-positives. Second, as there is only low quality evidence for how a true recurrence should be treated, suggestions for treatment (Grade 2C) depends on: the probable reason(s) for recurrence; and evidence that low-molecular-weight-heparins (LMWH) is more effective that vitamin K antagonists (VKA) in patients with cancer (who have a high risk of recurrence).

Treatment factors that predispose to recurrence include: (1) was anticoagulation started recently, as recurrence risk is highest during the first days and weeks of treatment; (2) was LMWH being used; (3) was the patient adherent; (4) was VKA subtherapeutic; (5) was anticoagulant therapy prescribed correctly; (6) was the patient taking a drug that reduced direct oral anticoagulant levels; and (7) had anticoagulant intensity been reduced.

Patient factors that predispose to recurrence include: (1) does the patient have known or suspected cancer; (2) is there an antiphospholipid antibody causing hypercoagulability or a lupus anticoagulant that is spuriously increasing INR results; and (3) is the patient taking a prothrombotic medication.

ACCP recommendations: (1) reevaluate the diagnosis of recurrence; (2) correct remediable causes for recurrence; (3) if there is no remediable cause and the patient is not on LMWH, switch to full-dose LMWH for at least 1 month; and (3) if the recurrence was on LMWH, increase the dose of LMWH by 25 to 33%.

DOACS vs. warfarin: is there a difference in management of recurrent DVT
Christopher Ward

Anticoagulation for DVT can incorporate a range of agents, from LMWH through warfarin to the newer DOACs (apixaban, dabigatran and rivaroxaban). All are effective, but large scale trials have only matched warfarin against DOACs in proximal lower limb thrombi to date. Head-to-head comparisons between DOACs are underway, but essentially, they show similar efficacy to warfarin, with some reduction in major bleeding. The pattern of bleeding on DOACs can differ, with higher rates of gastrointestinal bleeds offset by a larger reduction in intracranial haemorrhage. The appeal of a single agent strategy and fixed dosing has led to rivaroxaban and apixaban now dominating DVT treatment and secondary prevention in Australia. Although we lack trial evidence for upper limb DVT and superficial or calf vein thrombi, these agents are clinically useful, particularly when a short duration of therapy is needed. An important difference with warfarin is the observation (AMPLIFY Ext and EINSTEIN Choice) that reduced-dose DOACs can be used for secondary VTE prevention, with less bleeding risk. This is an appealing strategy for older patients and those who require indefinite treatment (unprovoked proximal DVT and PE). Subsets of patients may be better treated with warfarin, including renal impairment, the morbidly obese (over 120kg) and those with antiphospholipid antibodies. More evidence is needed before using DOACs for DVT associated with myeloproliferative disorders or in atypical sites (cerebral or splanchnic).

Recent trials have shown that DOACs are as effective as dalteparin in patients with cancer-associated VTE, offering these patients an alternative to longterm LMWH.
ENDOVENOUS INTERVENTIONS AND SURGERY

Update on ClariVein (MOCA) for GSV ablation
Lowell Kabnick

The use of a combination of mechanical and chemical ablation (MOCA) is a methodology to treat superficial venous reflux without tumescent anesthesia. The ClariVein device is comprised of an infusion catheter and a rotating tip. This device was first commercialized in 2010 and studied in over 1,755 patients, the aggregate pool from all studies. To date, greater than 100,000 procedures have been performed.

Updated clinical guidelines by the American Venous Forum (AVF) in March 2017, in the Handbook of Venous and Lymphatic Disorders: the American Venous Forum issue a recommendation (1B) for ClariVein use in the treatment of varicose veins. The AVF observed that non-thermal technologies have inherent advantages over thermal techniques including: minimal nerve or skin damage and decreased patient discomfort. Importantly, AVF concluded that the advantages of NT “do not sacrifice safety, efficacy, or clinical outcomes” when compared to existing thermal ablation techniques. In addition, the AVF issued a 1 B recommendation that NT technologies, such as ClariVein, be used for above-knee great saphenous vein (GSV) treatment for vein diameters less than 12 mm. This recommendation is in addition to a separate recommendation for MOCA procedures to treat: (1) small saphenous vein (SSV) incompetence with diameter <10 mm; (2) mildly tortuous GSV / SSV due to steerable wire; and (3) below-knee GSV incompetence to the ankle for C2-C6 disease (Recommendation Grade 2B).

Of interest and on the cutting edge, is that some Interventionalists are using ClariVein for dialysis access declots.

Wavelength or fiber: which is more important for GSV ablation
Lowell Kabnick

213 limbs were treated with an 810, 980, or 1470nm laser, with bare-tip (BT) or jacket-tip (JT) fibers. JT had lower pain scores (PS) as compared to BT fibers at 810-nm (P<.0005) and at 980nm (P<.0005). JT had lower bruising scores (BS) as compared to the BT fibers at 980nm (P<.0005). In-vitro study showed lower thermal injury depths for JT as compared to BT at 810nm (P<.0005) and at 1470nm (P<.0005). 980nm had lower PS as compared to 810nm with BT (P=.015), and with JT similar result trended toward significance (P=.057). 980nm JT showed less BS compared to 810nm JT (P=.019). 1470nm JT showed less bruising as compared to the 810nm JT (P=.038). In-vitro study showed thermal injury depths that were less for 1470nm as compared to 810-nm, with JT (P<.013) or with BT (P=.001). All mean differences between JT and BT were greater than between differing wavelengths. Multivariate analysis showed mean difference between 1470nm and 810nm of 0.26 mm, P<.0005 favoring 1470nm and mean difference between JT and BT of 0.61 mm, P<.0005 favoring the JT.

Jacket-tip fibers appeared to be more significant in reducing pain and bruising as compared to longer wavelengths. The results appeared additive, and the cohort using 1470nm laser with a jacket-tip fiber produced the best treatment outcomes.

What is the best adjunctive treatment for superficial varices when using thermal or mechano-chemical ablation for saphenous veins?
Philip Coleridge-Smith
The British Vein Institute, London, United Kingdom

Thermal ablation techniques such as laser ablation and RF ablation as well as mechanochemical ablation are widely used to treat saphenous trunks and have a low recanalization rate. However, studies of recurrence after varicose veins treatment show that accessory veins and saphenous tributaries are often to the source of development of new varices. How are these best treated?
A commonly used method is to undertake phlebectomies, usually during the same session as the truncal ablation procedure. This is not normally undertaken as an ultrasound guided procedure and has the potential to leave considerable numbers of accessory and tributary veins. In addition, phlebectomy has the disadvantage that skin incision may lead to wound infection and healing problems, including scars. Collateral damage to cutaneous nerves and lymphatic vessels may also arise.

Foam sclerotherapy is also a commonly used adjunctive treatment to thermal ablation. This method has the advantage that it is normally carried out under ultrasound guidance and may be more rigorous in eliminating the accessory veins and saphenous trunks. It has the disadvantage that it may give rise to phlebitis, tender lumps and persistent skin pigmentation.
The method of choice in a particular patient may depend on patient factors as well as the phlebologist’s preferences.

Optimizing safety of tumescent anaesthesia in the era of rooms based procedures
David Scott

Tumescent local anaesthesia enables surgery under local anaesthesia for wide operative fields extending well into subcutaneous tissue planes. The use of dilute local anaesthetic solutions with adrenaline generally means that large volumes of local anaesthetic can be administered. All local anaesthetics are toxic drugs, and systemic effects may occur either through absorption of a high dose through tissue planes or from inadvertent injection directly into a blood vessel. Case reports have entered the media of patients suffering cardiac arrest or even death associated with cosmetic surgical procedures. Compounding this is the use of intravenous sedation. A combined position statement from the Australian and New Zealand College of Anaesthetists (ANZCA), RACS, and the Australian Society of Plastic Surgeons states that procedures where intravenous sedation, or potentially toxic doses of local anaesthetic are used, must be done in a registered facility with appropriate equipment and staff resources and training.

Provided appropriate safety measures and precautions are in place, a careful injection technique using a modest carefully calculated total dose of lidocaine with adrenaline, adjusted for patient and procedural factors, should not result in toxic levels to the patient because of slow absorption. With liposuction, roughly 30% of the administered dose might be expected to be removed by the process, but in other circumstances all the local anaesthetic administered will eventually be absorbed systemically with blood levels peaking 10-14h after injection. Practitioners must have full knowledge of the symptoms and signs of LA toxicity and the means to manage it should it occur.
Are recurrent varicose veins after endovenous treatment or after surgery so different?

Marianne De Maeseneer
Section Phlebology, Department of Dermatology, Erasmus MC, Rotterdam, The Netherlands

Nowadays the term ‘recurrent varicose veins’ has been replaced by PREVAIT (= PREsence of VArices after Interventional Treatment). In patients with PREVAIT we have to differentiate between residual and recurrent varicose veins.

Residual varicosities depend on the pre-treatment distribution of varicose tributaries. Varicosities in direct connection with the refluxing target vein, although so called ‘revascularisation of the strip track’ may appear to be more frequent. This results in a significantly higher rate of post-surgery recurrence of the great saphenous vein (GSV) neovascularization is more frequently seen, whereas after GVA refluxing SFJ tributaries appear to be more frequent. This results in a significantly higher rate of recurrent varicose veins originating from the SFJ region after GVA than after surgery. A typical anatomic pathway of recurrence after GVA is (persistent or recurrent) reflux at the SFJ and anterior accessory saphenous vein (AASV), reported in 20 to 40% of treated limbs.

- At the level of the treated segment or complete recanalization may occur after initial successful obliteration in 5 – 15% of treated truncal veins. This is obviously not the case after successful stripping of the target vein, although so called ‘revascularisation of the strip track’ may occur and result in clinical recurrence.
- Perforating veins may also play a role in recurrence, although the available literature is conflicting and it cannot be concluded whether their incidence and role in recurrence is different between surgery and GVA.

Finally, new sites of reflux may be due to progression of the disease resulting in clinical recurrence, both after GVA and after surgery.

Results of treatments of recurrent varicose veins, history-based review

Jean Guex

“REVAS and PREVAIT” are the presence of Varicose veins in a limb previously treated. There is a difference with “recurrences” that include networks which were not considered at the time of the initial treatment. They also differ from “failure” which is specifically determined by the patient’s dissatisfaction.

Looking back to the history of phlebology since the 80’s allows us to understand better recurrences since they do not all have their cause in the same phenomenon, do not appear at the same site, not for the same reason, and do not obey the same mechanisms.

The outbreak (in the 90’s) of new assessment technologies (Duplex US) and of new therapeutic concepts regarding venous ablation and management of terminal valve incompetence at junctions, have brought useful information on the mechanisms. They have also been followed by an overall reduction of recurrences both in terms of frequency and severity. The use of Patient reported Outcome Measurements (PROMs) like Quality of Life Measures (QoL) has allowed to verify a high level of satisfaction of patients at mid and even long term (5 years). New methods have dramatically improved the management of VV, and have also benefited to open surgery, which, when carried out according to protocols like those of ablations has demonstrated a satisfactory profile, comparable to that of other methods.

Mid-term and long-term RCTs are currently available and demonstrate that since satisfaction or patients is generally observed, treatment of varicose veins, provided the technique is appropriately executed, is not synonym of failure anymore.

Ultrasound examination of recurrent varicose veins

Attilio Cavezzi
Eurocenter Venalinfa, S. Benedetto del Tronto, Italy

Varicose vein treatment (VVT) may result in a variable recurrence rate (up to 50% at 5 years after surgery). Duplex-based recurrence rate is usually higher than the clinical one, as many refluxing veins may not be clinically relevant. Colour-duplex ultrasound (CDU) highlights different morpho-hemodynamic patterns related to recurrence after surgery or endovenous thermal/chemical ablation. Adequate settings (e.g. low PRF) and operator’s skill objectively influence accuracy of CDU investigation. A few of the possible causes of recurrence are: progression of the disease with newly formed (refluxing or not) varices in the treated deep veins. CDU-based recurrence rate is usually higher than the clinical one, as many refluxing veins may not be clinically relevant. Colour-duplex ultrasound (CDU) highlights different morpho-hemodynamic patterns related to recurrence after surgery or endovenous thermal/chemical ablation. Adequate settings (e.g. low PRF) and operator’s skill objectively influence accuracy of CDU investigation. A few of the possible causes of recurrence are: progression of the disease with newly formed (refluxing or not) varices in the treated deep veins. CDU-based recurrence rate is usually higher than the clinical one, as many refluxing veins may not be clinically relevant. Colour-duplex ultrasound (CDU) highlights different morpho-hemodynamic patterns related to recurrence after surgery or endovenous thermal/chemical ablation. Adequate settings (e.g. low PRF) and operator’s skill objectively influence accuracy of CDU investigation. A few of the possible causes of recurrence are: progression of the disease with newly formed (refluxing or not) varices in the treated deep veins. CDU-based recurrence rate is usually higher than the clinical one, as many refluxing veins may not be clinically relevant. Colour-duplex ultrasound (CDU) highlights different morpho-hemodynamic patterns related to recurrence after surgery or endovenous thermal/chemical ablation. Adequate settings (e.g. low PRF) and operator’s skill objectively influence accuracy of CDU investigation. A few of the possible causes of recurrence are: progression of the disease with newly formed (refluxing or not) varices in the treated deep veins. CDU-based recurrence rate is usually higher than the clinical one, as many refluxing veins may not be clinically relevant. Colour-duplex ultrasound (CDU) highlights different morpho-hemodynamic patterns related to recurrence after surgery or endovenous thermal/chemical ablation. Adequate settings (e.g. low PRF) and operator’s skill objectively influence accuracy of CDU investigation. A few of the possible causes of recurrence are: progression of the disease with newly formed (refluxing or not) varices in the treated deep veins. CDU-based recurrence rate is usually higher than the clinical one, as many refluxing veins may not be clinically relevant. Colour-duplex ultrasound (CDU) highlights different morpho-hemodynamic patterns related to recurrence after surgery or endovenous thermal/chemical ablation. Adequate settings (e.g. low PRF) and operator’s skill objectively influence accuracy of CDU investigation. A few of the possible causes of recurrence are: progression of the disease with newly formed (refluxing or not) varices in the treated deep veins. CDU-based recurrence rate is usually higher than the clinical one, as many refluxing veins may not be clinically relevant. Colour-duplex ultrasound (CDU) highlights different morpho-hemodynamic patterns related to recurrence after surgery or endovenous thermal/chemical ablation. Adequate settings (e.g. low PRF) and operator’s skill objectively influence accuracy of CDU investigation. A few of the possible causes of recurrence are: progression of the disease with newly formed (refluxing or not) varices in the treated deep veins. CDU-based recurrence rate is usually higher than the clinical one, as many refluxing veins may not be clinically relevant. Colour-duplex ultrasound (CDU) highlights different morpho-hemodynamic patterns related to recurrence after surgery or endovenous thermal/chemical ablation. Adequate settings (e.g. low PRF) and operator’s skill objectively influence accuracy of CDU investigation. A few of the possible causes of recurrence are: progression of the disease with newly formed (refluxing or not) varices in the treated deep veins. CDU-based recurrence rate is usually higher than the clinical one, as many refluxing veins may not be clinically relevant. Colour-duplex ultrasound (CDU) highlights different morpho-hemodynamic patterns related to recurrence after surgery or endovenous thermal/chemical ablation. Adequate settings (e.g. low PRF) and operator’s skill objectively influence accuracy of CDU investigation. A few of the possible causes of recurrence are: progression of the disease with newly formed (refluxing or not) varices in the treated deep veins.
After VVT the combination of CDU investigation with clinical assessment (symptoms in primis) represents the best approach to follow-up and possibly suggest an adequate re-treatment.

**How to prevent progression and recurrence of varicose veins**
Marc Vuylsteke

Chronic venous disease is a very common and underestimated disease. Its prevalence increases with age.

Venous disease is a progressive disease, which means that if untreated, the disease will become more extensive. The underlying pathophysiology is persistent venous hypertension and a local inflammatory process. These are significantly influenced by some risk factors, such as obesity, orthostatism, (not having) regular exercise, pregnancy, smoking, having a positive family history (genetics?), female gender and age.

Varicose veins can be eliminated using several kind of interventions, such as (foam) sclerotherapy, endovenous techniques and surgery. These interventions do result in a significant improvement of patients quality of life. However high a recurrence rates are noted. The causes of recurrences are multifactorial. Some are due to tactical and technical errors. Untreated persistent venous hypertension, such as iliac obstruction, pelvic congestion or post-thrombotic syndrome, can provoke recurrence. Neovascularisation is a major cause of recurrence. The underlying physiology, however, remains a point of discussion. But recurrence can also be due to newly formed incompetence of perforating veins, reflux in new segments, anatomic extensions of previously incompetent truncal veins, or a combination of these. This is also progression of disease and account for 20-50% of all recurrences.

Possibilities to prevent recurrence are limited. Avoiding tactical and technical errors, looking to correct possible persistent venous hypertension can reduce recurrences. Modifying the risk factors can somehow influence the progression of the disease. Unfortunately in most patients, the underlying progression of disease is not preventable.
DEEP VENOUS OBSTRUCTION

Why are so many venous stents deployed for swollen legs
Lowell Kabnick

The incidence of symptomatic venous outflow obstruction is estimated at more than 1 million patients per year in the US and Western Europe. This obstruction manifests in venous disorders ranging from acute DVT to chronic postthrombotic syndrome. The clinical research supporting stenting in chronic cases is significant and early intervention, including stenting, in the case of acute DVT is growing.

As there is no hemodynamic test for venous obstruction, morphological assessment of stenosis is the standard. In the case of non-thrombotic iliac vein lesions (NIVL), this raises the question as to what degree of stenosis warrants treatment? The simple answer to the question is screening patients to ensure symptomatic patients are treated, and not just stenosis. Patient selection in treatment of venous outflow obstruction, and specifically in the case of NIVL, should include evaluation of clinical severity, investigation through various imaging modalities and assessment of whether the patient may be successfully stented.

Awareness of the impact of deep venous disease on patients is on the rise. Stenting is not a panacea; patients require ongoing follow-up, including comprehensive strategies of anticoagulation therapy. The availability of dedicated venous stents, which require different physical properties than arterial stents, may increase the effectiveness of venous interventions. Venous outflow obstruction can be effectively treated, with significant opportunity for improved patient outcomes.

Veniti Venous stent trial (feasibility) 2 year follow-up report
Lowell Kabnick

The objective of this study is to assess the safety and efficacy of the VENITI VICI VENOUS STENT® System in achieving patency of the target venous lesion in patients who present with clinically significant chronic non-malignant obstruction of the iliofemoral venous outflow tract.

The VIRTUS Study is a prospective, multicenter, single arm, non-randomized study to define safety and efficacy of the VICI VENOUS STENT in relation to pre-defined objective performance goals. A maximum of 200 patients were enrolled at 22 centers worldwide, 7 of these centers were in the European Union. For the feasibility cohort, 30 patients were enrolled at approximately 7-10 centers, and the remaining 170 patients were enrolled in the pivotal arm. Both the feasibility and the pivotal patient populations included symptomatic adults ≥18 years of age.

The follow-up period is 60 months. The primary efficacy endpoint for this study is the primary patency rate at 12 months post-intervention. At 12 months, primary, assisted-primary, and secondary patency were 93%, 96%, and 100%, respectively. The secondary efficacy endpoint is improvement in venous clinical severity score (VCSS) by at least 50% at 12 months post-intervention:

<table>
<thead>
<tr>
<th>Baseline (n=30)</th>
<th>12 months (n=27)</th>
<th>P value</th>
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<tr>
<td>VCSS</td>
<td></td>
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<tr>
<td>10 (2-25)</td>
<td>4 (0-23)</td>
<td>&lt;0.001</td>
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The primary safety endpoint for this study is major adverse event within 30 days. One MAE (3.3%) was reported, a hematoma at the puncture site.

Chronic venous obstruction: an update on diagnosis and management
Antonios Gasparis

The diagnosis of chronic venous obstruction is challenging. Clinical evaluation plays an important while imaging is used to confirm clinical suspicion. The limitation of imaging is the absence of hemodynamic evaluation of a significant stenosis and the reliance of anatomic findings. Duplex ultrasound can be useful for screening of disease although with limitations, while axial imaging has its own shortcomings. The above modalities are very operator-dependent. Venography and IVUS has been the gold standard in diagnosis providing excellent anatomic evaluation, accurate diameter/area reduction, extent of disease and a guide for intervention and post-intervention evaluation. IVUS is especially useful for compressive lesion evaluation although there is no validated cut-off on significant area reduction and should be based in combination to clinical presentation.

Indications for treatment include, venous claudication, C3 disease with no other underlying cause, and C4-C6 disease. Venous stenting has become the treatment of choice for venous obstruction with excellent technical outcomes. Non-dedicated venous stents are being replaced with dedicated venous stents with very early results available. Although venous stenting has exploded in the treatment of venous obstruction there remains a paucity of data on outcomes and long-term results. Several industry studies and the multicenter NIH funded C-TRACT study will be available in the next few years to provide guidance for treatment.

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ACP PLENARY

Update on fibrinolysis
Robert Medcalf

The fibrinolytic system is well known for its role in the removal of fibrin deposits and has been harnessed therapeutically for decades to remove blood clots in patients with thromboembolic conditions, including ischaemic stroke. This occurs via the generation of the potent protease, plasmin, which is formed following the activation of plasminogen by tissue-type plasminogen activator (t-PA). However, the fibrinolytic system is now known to extend far beyond clot removal, with key roles with the central nervous system, where t-PA, via either plasmin-dependent or independent means can modulate blood brain barrier (BBB) permeability, memory function, and addictive behaviour. More recently, t-PA/plasmin has been shown to have profound effects on the innate immune response, mostly in the promotion of an immunosuppressive state. While the mechanistic underpinnings of these new functions are still being unravelled, many of these effects are mediated, at least in part, via receptors for t-PA and/or plasminogen. The binding or cleavage of these cell surface receptors can not only facilitate cell-surface proteolysis, but can also trigger intracellular signal cascades. Such signalling cascades in turn promote increases in BBB permeability, have multiple effects on the innate immune response or can activate other enzyme cascades (i.e. the MMPs). While most of these non-fibrinolytic attributes of t-PA/plasmin have been derived from rodent models, evidence has now accumulated confirming at least some of these effects of t-PA/plasmin also occur in humans. This presentation will overview this growing area of the plasminogen activating cascade with a focus on the immune response.

Targeted theranostic microbubbles: concurrent ultrasound diagnosis and treatment of thrombosis
Karlheinz Peter, Xiaowei Wang
Baker Heart Institute, Australia

Background: Thrombotic diseases are leading causes of morbidity/mortality. The typical underlying pathology is the formation of thrombi/emboli and subsequent vessel occlusion. Systemically administered fibrinolytic drugs are a highly effective pharmacological therapy. However, bleeding complications are relatively common and the reason why many miss out on fibrinolytic therapy. Furthermore, a rapid non-invasive imaging technology is not available. Thereby, many thrombotic events are either not recognised at all or early enough to avoid irreversible damage. Aims: Design and preclinical testing of a novel ‘theranostic’ technology for the rapid non-invasive diagnosis and effective, bleeding-free treatment of thrombosis. Methods: We created innovative theranostic microbubbles by combining recombinant fibrinolytic drug, an echo-enhancing microbubble and a recombinant thrombus-targeting protein in form of an activated-platelet-specific single-chain antibody.

Results: After initial in vitro proof of functionality, we tested this theranostic microbubble, both in ultrasound imaging and thrombolytic therapy, using a mouse model of ferric-chloride-induced thrombosis in the carotid artery. We demonstrate the reliable highly sensitive detection of in vivo thrombi and the ability to monitor their size changes in real time. Furthermore, these theranostic microbubbles proved to be as effective in thrombolysis as clinically used urokinase but without the prolongation of bleeding time as seen with urokinase. Conclusions: We describe a novel theranostic technology enabling simultaneous diagnosis and treatment of thrombosis, as well as monitoring of success or failure of thrombolysis. This technology holds promise for major progress in rapid diagnosis and bleeding-free thrombolysis thereby potentially preventing the often devastating consequences of thromboembolic disease in many patients.

The future of phlebology. Where are we heading?
Louis Grondin

There is a strange analogy between the NASA Voyager mission and the field of Phlebology. The UIP was founded as an international task force to search for the cause and management of Venous disorders, an age related condition that is characteristic of bipedal humanity. Very much like Voyager 1 and 2, phlebology has navigated dangerously close to not merging into any of them. The fate of Phlebology is intimately linked to mankind and his destiny, and again not unlike the Voyager mission, when its initial purpose will have been fulfilled, it is likely to take us into the space age and beyond.

Venous mapping
Kourosh Parsi

Background: To start a UIP Consensus on standardization of venous mapping.

Methods: Review of venous maps from various centres.

Results: Large number of inconsistencies were found in maps produced by different sonographers and centres. Occasionally the same technician working from different centres produces different maps. Inconsistencies relate to:
1. Structures to be mapped/imaged in every case such as superficial and deep venous system, duplications, agenesis or absence, small saphenous artery, popliteal compression and Baker’s cyst.
2. Vessel names
3. Vessel diameters and measurements
4. Graphic notations such as colour, arrows and other notations as it relates to competence, patency and previous treatments (stripped, occluded, sclerosed, thrombosed) and other findings.

Conclusions: UIP consensus group should define consistent and standardized guidelines for venous mapping.
VENERO CASEMBOEMBOLISM

Management of thromboembolism (venous and arterial) in patients with APS

Doruk Erkan
Barbara Volcker Center for Women and Rheumatic Diseases, Hospital for Special Surgery, Weill Cornell Medicine, New York, USA

Antiphospholipid antibodies (aPL) are a family of autoantibodies directed against phospholipid-binding plasma proteins, most commonly β2-glycoprotein I. Thromboembolic manifestations of aPL range from microthrombosis to arterial/venous thrombosis to catastrophic antiphospholipid syndrome (APS). Diagnosis of APS should be made in the presence of characteristic clinical manifestations and persistently positive aPL (measured at least 12 weeks apart). Primary thrombosis prevention in persistently aPL-positive individuals requires a risk-stratified approach; elimination of reversible thrombosis risk factors and prophylaxis during high-risk periods are crucial. The effectiveness of low-dose aspirin is not supported by prospective controlled studies; it can be considered in aPL-positive patients with additional cardiovascular disease risk factors. Prevention of secondary thrombosis lacks a risk-stratified approach; the effectiveness of high-intensity anticoagulation is not supported by prospective controlled studies. Catastrophic APS patients usually receive a combination of anticoagulation, corticosteroids, and intravenous immunoglobulin (IVIG) and/or plasma exchange. Recent studies, based on newly understood mechanisms, suggest that novel approaches that target new immunomodulatory pathways, e.g., statins, hydroxychloroquine, B-cell inhibition, complement inhibition, and mammalian target of rapamycin (mTOR) pathway inhibition, can be considered in the management of selected aPL-positive patients.

Cancer associated VTE: an Asian perspective

Pantep Angchaisukisiri

Thrombosis is a common complication in cancer patients. Although the major inherited risk factors for thrombophilia are different between Asians and Caucasians, the main acquired risk factors that are associated with the development of venous thromboembolism (VTE) in Asians appear to be similar to those for Caucasians. Malignancy is the most important acquired risk factor for VTE in Asians. Recent studies have shown that the incidence of VTE is significant in Asian patients with cancer, particularly those in an advanced stage of cancer. Cancer associated VTE is more severe and associated with higher morbidity with cancer, particularly those in an advanced stage of cancer. Incidence of VTE in Asia has clearly increased over time across multiple population-based and hospital-based studies, with a 5-fold increase between 1997 and 2008 in a very large Chinese PE registry, and a 5-fold rise in admissions with acute DVT at a Singaporean hospital between 1990 and 1997. Likely reasons are probable under-diagnosis and reporting in early studies, followed by improved diagnosis in later years with greater awareness that VTE is an issue in Asian populations. Nevertheless, it seems likely that there is a genuine increase in VTE prevalence in Asian populations, because of increasing population age, increasing cancer rates, and an increasing number of surgeries. The co-morbidities and predispositions for VTE are similar in East Asia and in the West, most notably: old age, cancer, previous VTE, immobility, trauma and surgery, and inflammation. The findings is dispelling a deep rooted perception that VTE is a rare occurrence in Asian patients and highlight the need for awareness that VTE is an important disorder in Asian populations.

Incidence of venous thromboembolism (VTE) in Asia
Lai Heng Lee

Incidence of VTE has not been reported in many Asian countries. The population-wide estimates of annual VTE rates in Korea, Taiwan and Hong Kong (13.8, 15.9, and 19.9 per 100,000 people, respectively) are about 15-20% of the level recorded in Western countries (approximately 100 per 100,000 people). The near absence in Asia of thrombophilias such as factor V Leiden and prothrombin gene mutations has been speculated as a reason for the lower VTE rates in Asia. However, the reported incidence of VTE in Asia has clearly increased over time across multiple population-based and hospital-based studies, with a 5-fold increase between 1997 and 2008 in a very large Chinese PE registry, and a 5-fold rise in admissions with acute DVT at a Singaporean hospital between 1990 and 1997. Likely reasons are probable under-diagnosis and reporting in early studies, followed by improved diagnosis in later years with greater awareness that VTE is an issue in Asian populations.

The risk of bleeding with DOACs in East Asia: East Asians with lower body weight and lower kidney function have a high incidence of intracranial hemorrhage and DOACs are expected to particularly benefit East Asians
Satoshi Fuji

East Asians have approximately 20 kg lower body weight than Caucasians (an average of 60-70 kg in the East Asians and 80-90 kg in Caucasians). As a result, when the body frame is small, East Asians have lower kidney function compared to Caucasians. While East Asians have a relatively low incidence of myocardial infarction, they have a relatively high incidence of cerebrovascular accidents compared to Caucasians. East Asians have a markedly higher incidence of intracranial hemorrhage compared to Westerners. Compared to Caucasians the incidence was twice as high among blacks and Hispanics. The incidence was four times as high among Asians. East Asians may endogenously have high rate of stroke or systemic embolic event (ENGAGE AF-TIMI 48). East Asians have lower warfarin TTR (time in therapeutic range). The causes of higher rate of intracranial bleeding in Asians are not clearly understood. The causes may include high-salt food, prevalence of hypertension, lower creatinine clearance and higher rate of previous stroke. Higher frequencies of polymorphism linked to warfarin actions and metabolism are also indicated. Japanese physicians may have lower settings than in western countries for the doses of alteplase in acute ischemic stroke, ticlopidine, rivaroxaban and optimum dose management of warfarin. For instance, with edoxaban, in representative Phase III trials the warfarin dose was maintained at a lower level for East Asians. However, there was a higher incidence of intracranial hemorrhage among East Asians than Caucasians. When edoxaban is used instead of warfarin, there is reduction of the incidence of intracranial hemorrhage.
SCLEROTHERAPY

Safety aspects of foam sclerotherapy
Lorenzo Tessari
Bassi Foundation, Trieste, Italy

Background: Modern foam sclerotherapy has gained popularity over the past few years. Using Tessari’s method, the sclerosant solution is mixed forcefully with air or carbon dioxide using a technique employing two syringes and a three-way connector to create a foam, which is injected into veins being treated. The sclerosant, which coats the gas bubbles, tends to linger against the endothelial surface of the veins rather than be washed out. This allows more contact time for the sclerosant to cause endothelial and vein wall damage. The end result is thrombosis and fibrous obliteration of the vein. What happens if the sclerosant drug reach the lung still activated? Some transient adverse events (dry cough, chest tightness) are described in literature.

Aim: To detect and quantify the uptake of 99m-Pertechnetate in transit organs (lungs, heart) and in target organs (thyroid, salivary glands, stomach) and consequently to assess the possibility of recognizing a pulmonary injury in these patients. Method: A first study with echocardiography was performed to check the arrival time of the bubbles and their persistence modalities and time within the atrium (after a standardised injection of sclerosant foam). Scintigraphic studies, with 99mTcO4-alone (120 MBq), mixing it with the sclerosant drug/microbubbles and after ten min from the sclerotherapy, were carried out in two patients (both male, 62 and 56 years old), on a double-head gamma camera. Four cc of foam were injected, at intervals of 5 to 7 days, into a collateral saphenous vein with a Butterfly not in Trendelenburg position (foam: Polidocanol 2% + air/CO2 O 2 or Tetradecylsulfate 1% + air/CO2 O 2). Dynamic acquisitions were focused on the chest and the neck (total 1800 sec). Semiquantitative analyses were performed with region-of-interest (ROI), which were drawn over the lungs, heart, thyroid and stomach. The cpm in ROIs were plotted against time and the curves were fitted (counting out the initial transient phase).

Results: By means of echocardiography, bubbles arrived in 20 sec into the heart and persist for 10 min. The lacking of important variations in the time/activity curves of the lungs between the first and the last sclerotherapeutic tests tends to indicate, at first instance, that there is no pulmonary damage neither immediately nor at short observation. Our results were an impetus for further analyses and discussion.

Interaction of laser energy with foam
Louis Grondin

In the last 10-15 years, endovenous thermal ablation, has nearly replace surgery as the treatment of choice of incompetent Saphenous Veins. In the case of endovenous laser ablation, the ambulatory nature of the procedure, the reduced incidence of complications (especially when higher laser wave lengths are used), and the predictably good and lasting outcomes, likely played a major role in this transition.

The procedure in not free of complications however, thrombus extension into the deep venous system, and adventitial arterio-venous fistulas have been reported. In order to reduce these complication 2 technique have been developed: one is the use of radial tip fiber, and the other is to laser through foam. The later offers the added advantage of overcoming one of endovenous laser’s innate weakness: which is reaching and eliminating the often complex and multiple saphenous termination into the deep venous system.

But what exactly does happen when a laser beam interacts with foam? Two main phenomena have been observed:
1. A resonant effect, which results in profound laser beam refraction and directional change, which effectively transforms a bare tip fiber emission into a radial tip emission, distributing laser light energy uniformly to the adjacent vein wall.
2. And a dominant un-resonant effect, which results, within 100 microseconds after laser impact, in nano-water droplet deformity, and hydrojets propulsions at hypersonic range, which should have a destabilizing effect on the foam structure. This un-resonant effect is proportional the the energy delivered and inversely proportional to the wave length emitted.

Tessari’s foam: a fairytale or a story (18 years of research and testing)
Lorenzo Tessari
Bassi Foundation, Trieste, Italy

In phlebology in the last years varicose vein sclerotherapy has undergone radical developments and changes. In 1944 ORBACH introduced the air-block method, in 1989 KIGHT and VIN proposed an ultrasound guided sclerotherapy method. In December 1999, in Paris, TESSARI presented the TOURBILLON METHOD (Tessari- method); it was studied to satisfy the demand of creating a sclerosing foam feasible, instantaneous, easy-to-use and cheap, which was able to maintain the typical features of sclerosing foams (adhesiveness, compactness, durability, echo visibility); the author wanted to create a dense foam, with regular micro-bubbles, temporarily steady, to produce and keep the foam in sterile environment, using disposable plastic syringes, to standardise easily the preparation method, to specify and establish new dosages in quantity and concentration of surface-active sclerosing drugs for the different varicose vein situations.

Many clinical studies have validated this technique in recent 18 years in the field of varices sclerotherapy including telangiectasies; sclerotherapy of the hemorrhoidal varices even with direct and retrograde endoscopical technique; sclerotherapy of varicocele even with anterograd and retrograde technique; oesophageal varicose vessels sclerotherapy in their bleeding form taking advantage of the lasting angiospasms that sclerofoam is able to induce against vascular tissue, and a non vascular employment of the foam concerning hydroleo therapy in which foam is injected displacing the drained liquid and so allowing a prolonged contact of the drug with the vaginal tunic with the consequence venofibrosis.

Now a new technical procedure (mixtures of gas) for the production of the Tessari’s sclerotherapy-foam is emerging: it consist in using a mixture of soluble and biocompatible gas (CO2 + O2)to make sclerotherapy-foam instead of air.

We can affirm sclerosing effect depends on a “minimal effective concentration”, and on the exposure time: the longer is this time, the lower is this minimal effective concentration.

Emerging therapy: spherical bubbles of macrofoam for small veins
Pauline Raymond-Martimbeau

METHODS: A total of 110 patients aged 25-65 years (mean 49.2y) were studied. A single or multiple injections of STS 1% macrofoam made of spherical bubbles of >500 μm (ratio 0.5cc liquid/4cc gas) were administered using a 27G ½ inch winged infusion set. The total volume injected per injection was 0.45 mL for a total of 5mL per session. The injection
was monitored by Duplex ultrasound. The primary outcome measure was total sclerosis and adverse reactions. The following efficacy criteria were also measured: symptoms [measured with a visual analog scale (VAS)] and patient satisfaction with a questionnaire (PSQ)).

**Results:** Injection of spherical bubbles of STS 1% macrofoam for small veins was technically successful after 1-month (87.3%), 6-month (90.9%) and 12-month (93.6%). The number of sessions needed was (3.6). No major complications were noted. Light hyperpigmentation was noted in 2 patients (0.02%) at 6-month, recurrence in 1 patient (0.01%) at 12-month follow-ups. A statistically significant reduction in symptoms (P<0.0001) in symptomatic patients was seen. A majority of patients (96.1%) regarded their overall satisfaction to be excellent/very good after 6-month follow-up.

**Conclusions:** Macrofoam of spherical bubbles was well tolerated in patients with small veins. There was no major complication noted. Further study is warranted and acoustic droplet vaporization needs to be exploited for this technique.

**Is foam sclerotherapy a first choice in the treatment of varicose veins**

Lorenzo Tessari  
*Bassi Foundation, Trieste, Italy*

The constant use of the doppler ultrasound, by an ever growing number of phlebologists has brought some of them to concentrate their studies on the mutually functioning relationships between safenic terminal and preterminal valves and femoral valves above and below the safenous cross.

Based on these principles, a study conducted on 1294 incontinent saphenous crosses using the compression – relaxation test, positioning the Doppler waves at groin level, demonstrated that complete incontinence of the terminal valve at the safenous-femoral junction is only present in 55% of the cases, while the remaining 45% show a continent valve, and it’s in these latter cases, in which ligation is an unnecessary operation, that it’s important to determine on what basis to choose among the various endoluminal treatments.

The beginning of this millennium has seen an enormous expansion in endovascular obliteration techniques (endovascular ELTV Laser, Radiofrequency VNUS Closure, Foam sclerosing trans catheter, long or short CEST.). These techniques, such as traditional sclerotherapy have the common feature that they can not treat the saphenous cross and are therefore exposed to possibility of recurrence or recanalization as we have seen in past years with surgery, which often consisted in a low ligation in the safenic cross, and then yielded an unlimited percentage of cavernoma of the residual safenous femoral junction.

In light of what was analyzed in previous studies we can assume that 45% of varicose patients with continent terminal femoral safenous, and in which you want to suppress safenic reflux, may be given the choice between endovascular obliteration techniques such as Laser, Radiorequence, Foam sclerosing, Cryotherapy. The selection criteria must in my opinion be in line with the question “CUI PRODEST?”
LEG ULCERS AND WOUND CARE

What improvements in patient treatment have arisen from research into the cause of venous ulceration?
Philip Coleridge-Smith
The British Vein Institute, London, UK

A great deal has been discovered about the causes of venous leg ulceration during the last 100 years. It used to be thought that ‘venous stasis’ i.e. lack of blood flow was the cause of leg ulceration. However, it has been shown that in patients with lipodermatosclerosis, increased blood flow is present in the limb and in the skin. It has been clear for many years that raised venous pressure in superficial veins is the physiological abnormality leading to the development of leg ulceration.

In 1988, my colleagues and I proposed a ‘white cell trapping’ hypothesis which sought to explain our observations that leucocytes were ‘trapped’ in the lower limbs during periods of venous hypertension. We thought that this might cause occlusion of capillaries leading to hypoxia of the skin. In fact, we were never able to show that skin hypoxia was present and discovered that many inflammatory process were at work in the skin in our patients with venous disease. These have been elucidated in much greater detail by subsequent authors.

It would be reassuring to know that these advances in knowledge have led to improved patient outcomes. However, the use of drug treatment in patients with leg ulceration has shown modest efficacy with a very limited number of drugs. There has been no dramatic improvement in leg ulcer healing. In the interim, much better ways of treating venous veins have been developed and these appear to be of great benefit in many leg ulcer patients.

Patients with leg ulceration often have similar impairment of venous function compared to those without leg ulceration. The reasons why some patients develop leg ulcers are still not well understood. Further elucidation of this conundrum may lead to the development of better pharmacological treatments for venous ulceration.

Advancements in local therapy: ulcer debridment
Giovanni Mosti

Debridement is an essential step to promote the wound bed preparation of an ulcer stuck in the chronic, inflammatory stage (covered by necrotic tissue, fibrin slough, infected, hyper-exuding …..) and is recommended at the first evaluation to remove necrotic tissue, fibrin slough, bacterial burden and senescent cells.

Debridement is one the key steps of Wound Bed Preparation that is based on the principles of TIME that means: T (Tissue): infected or necrotic tissue must be removed to promote an healthy granulation tissue, I (Infection): reduction of bacterial burden is crucial, M (Moisture): needs to be controlled, E (Epidermal migration): must be favoured for a successful outcome.

Debridement can be performed through different methods:
- Autolytic by moist wound dressing; mechanical by different methods (wet-to-dry, NPWT, ultrasounds, wound irrigation (by water) and wound vacuum cleaning; enzymatic: by ointment containing exogenous enzymes; biological: by larvae of Lucilla Sericata (not very much widespread) and sharp surgical by scalpel, scissors, curette, shaver or hydro surgery.

Compression update
Shashi Bhushan Gogia

Introduction: Compression therapy for ulcers initiated with the UNA Boot. Compression Therapy for lymphatic and venous edema started separately with the Mercury pump and later became established due to work done by a multitude of authors. That it works for both conditions is well established and lead to thinking that there is commonality between the pathogenesis of venous and lymphatic conditions. Phlebo-Lymphedema is now a well understood term and compression used to treat both conditions.

There is a complex interrelationship between edema and ulcers. Edema weakens intercellular bonding. Edema compresses capillaries diminishing the flow rate. Increased distance between blood vessels and tissues results in poor diffusion of nutritive support. Increased distance between ulcer edges means more epithelization is required for healing.

Ulcers on the other hand are a reason for fibrosis, scarring as well as recurrent infections related to easy bacterial ingress. All lead to higher chances of lymphedema with or without a venous component acting separately. Compression is useful in both conditions.

Methods: Retrospective analysis of patients undergoing Complex Decongestive Therapy (CDT) in a Lymphedema clinic using data extracted from an Electronic Medical Record (EMR) system.

Results: 668 patients were seen over a 10 year period. 53 had ulcers. There was a 50% average reduction in limb volume sustained on follow-up unless attacks of Adeno-Dermato Lymphangitis Attacks (ADLA) occurred. In parallel, 50 of 53 ulcers healed including 4 patients with an over 12 year history.

Conclusions: Compression therapy is useful in ulcers but reasons need more study.

How to prevent ulcer recurrence
Kathleen Finlayson

Up to 70% of venous leg ulcers recur after healing, yet health systems are slow to embrace the long-term chronic disease management approach needed for effective management of older adults with chronic venous insufficiency. The highest rates of recurrence are within three months of healing, suggesting that comprehensive assessment and tailored preventive interventions at the time of healing are vital.

This presentation will describe outcomes from a research program which has identified risk and protective factors for recurrence; developed and prospectively validated a risk assessment tool for recurrence; and evaluated models of care which successfully increased client self-care knowledge of their venous disease, improved adherence to preventive treatments, and significantly delayed the mean time to ulcer recurrence (e.g. 18.8 weeks [95% CI 9.2–28.4] in a control group; compared to 63.2 weeks [95% CI 59.6–66.7]) for those receiving an intervention model of care (Log-rank test =38.58, P<0.001). This work suggests that early risk assessment, tailored management and long-term chronic disease management models of care have potential in reducing ulcer recurrence rates.

How to increase adherence to Guidelines
Carolina Weller

Evidence-based clinical practice guidelines (CPGs) are designed to improve quality of care and reduce practice variation by providing graded recommendations based on the best available evidence. They are intended as instruments of knowledge transfer to support decision-making by physicians, other health professionals and patients in clinical practice.
The goal is to increase high-quality care and reduce inappropriate interventions. While CPGs are effective tools for improving the quality of patient care and provide specific recommendations for daily practice, implementation is often suboptimal. Challenges arise when introducing evidence and CPG into routine practice. CPG dissemination and implementation activities frequently produce only moderate improvement in patient management. Substantial evidence suggests that behaviour change is possible, but this change may call for comprehensive approaches at different levels (doctor, team practice, hospital, and health system environment), tailored to specific settings and target groups.

A systematic review of the effectiveness and costs of different guideline development, dissemination, and implementation strategies to increase the uptake of CPGs will be reported using a four-step approach. 1) Who needs to do what, differently? 2) Which barriers and enablers need to be addressed? 3) Which intervention components (behaviour change techniques and mode(s) of delivery) could overcome the modifiable barriers and enhance the enablers? 4) How can behaviour change be measured and understood?

10 Years experience in venous ulcer treatment: the view from a surgeon
Cees Witteens

Standard care in venous ulcer treatment was compression and ambulation. Over the years it has been shown that superficial venous insufficiency should also be treated, reducing the recurrence rate with 50%.

In patients with recurrent ulcers, although adequately treated with compression and the presence of deep venous insufficiency are considered for deep venous valve reconstructions, unfortunately with bad results. Treatment of insufficient perforating veins has been shown to be effective in reducing the recurrence rate. The last 10 years more information is gathered related to the presence of a deep venous obstruction as a cause of deep venous hypertension. Identified deep venous obstructions in the ilio-common femoral tract and IVC (LET 3 and 4) can be successfully treated with recanalization and stenting, an option not available last century. Therefore the diagnostic workup in patients suffering an ulcer should be reevaluated. Only a duplex of the leg is not sufficient anymore. A complete duplex from calf veins up to the heart is necessary to get the proper diagnosis and therapeutic strategy.

Step one is treating the central venous obstruction, step 2, if identified, the superficial venous insufficiency should be treated with or without insufficient perforating veins. And if the ulcer(s) persist with an identified deep venous insufficiency a valve reconstruction can be considered. Of cause all will be treated with ambulatory compression throughout this period and after ulcer healing a short compression stocking class 2 or 3 is recommended for life.

The flowchart for venous ulcer care should be changed!!

Two biomarkers that assess healing status of venous leg ulcers
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Objectives: To determine if a biomarker exists that can accurately predict healing in venous leg ulcers.

Methods: Wound area and wound fluid were collected in 42 patients (aged 50–82 years) over 14 weeks. Wounds were classified as healing or non-healing using three consecutive weekly measurements, where the middle time point with decreasing wound sizes was classified as healing, and with increasing sizes was classified as non-healing. Wound fluid was analyzed for a panel of biomarkers using multiplex ELISA assays. Ethics approval was obtained from Fremantle Hospital and Health Sciences Human Research Ethics Committee.

Results: A total of 32 healing time points and 27 non-healing time points, with available wound fluid, were included in the analysis. Independent t-tests identified 13 biomarkers with a significant difference between healing and non-healing wounds (P<0.1). These markers were included in a multivariable regression model, and 2 biomarkers demonstrated a significant difference (P=0.01) - GM-CSF (P=0.001; odds ratio 126.5) and MMP-13 (P=0.004; odds ratio 24.8). Receiver operating curves and optimal cut-off points using Youden’s J statistic were used to determine the accuracy, sensitivity and specificity of these biomarkers in determining healing status. GM-CSF demonstrated a 92% accuracy and its optimal cut-off value had a sensitivity of 96% and a specificity of 81%. MMP-13 had a 78% accuracy with a sensitivity of 92% and a specificity of 61%.

Conclusions: This study found 2 biomarkers which can accurately discriminate between healing and non-healing chronic venous leg ulcers, with one biomarker having over 90% predictive accuracy.

Skin substitutes
Giovanni Mosti

The main characteristic of chronic leg ulcers (CLU) is their lack of tendency to spontaneously heal. When some risk factors occur (e.g. large size and/or long-duration, calf muscle pump impairment, obesity, arterial disease) CLU may not heal despite of a proper treatment and are defined refractory ulcer. In these cases the standard care often fails to achieve ulcer healing and may be extremely expensive due to endless treatment with frequent dressing and bandage changes, antibiotics when infection occurs, pain-killers, admission to hospital in case of complications. Surgical debridement and skin grafting may be offered to speed up the healing process of these patients after all other treatment modalities had failed. The autologous split thickness skin graft (STSG), is considered the gold standard for skin repair but it may fail in full thickness ulcers, when dermis layer is lost and must be rebuilt, as dermis cannot regenerate as many other tissues. Dermal substitutes are effective in dermis reconstruction as they require a less vascularized wound bed, increase the dermal component of the healed wound, reduce or remove inhibitory factors, reduce the inflammatory response and subsequent scarring, and provide rapid and safe coverage. Dermal substitutes may roughly be divided in bioengineered skin equivalents and bank bioproducts. The first ones are usually extremely expensive while bank bioproducts as skin from cadaver donors (hereafter allograft), are effective and much cheaper. After reconstructing dermis, a final Split Thickness Skin Grafting may achieve complete healing.

Tissue and mesenchymal stem cells
Roberto Brambilla

What is regenerative medicine about? Evolution of thought:
- Until ’70 traditional dressing (dry dressing).
- From ’80 advanced dressing (warm, wet).
Target: to promote the physiological process of repair.
In '90 new dressing grow up: interactive dressing and biointeractive dressing.

Cappable of interacting with the “microenvironment” of the wound and stimulating healing.

William Haseltine adopted the term of regenerative medicine to describe the regeneration of damaged tissue.

Elena Cattaneo in 2014 said: “regenerative medicine is reconstitution of a damaged tissue activating resident cells, or with cells transplantation”.

In chronic wounds cells are unable to transform.

In healing wounds monocytes evolves from M1 to M2, M2a and M2c/Mreg.

In chronicity, in vascular diseases, diabetes, inflammation, aging, polarization in M2, necessary for healing, is not possible. Acute inflammation becomes chronic, and macrophages remain M1.

New therapies approaches promote immunomodulation in M2.

We works on cells alone, extracellular matrix with cells and with dermal substitute.

In our experience we used dermal substitute (HYAFF, Collagen) with or without cells (we performed 4411 surgical procedure using dermal substitute, 1314 with cellular dermal substitute).

From long time we use mesenchymal cells from adipose tissue. One time using Coleman technics, now with new and easier technics that enable best quality of cells and tissue.

We treated about 160 patients with different etiology with really good results.

Another cellular technics we use is Monocytes from bone marrow and peripheral blood.

We treated about 180 patients with this technics.

Very high results in wound healing and in revascularization.

**Negative pressure wound therapy**

Knut Kroger

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Negative pressure wound therapy (NPWT) plays a great role in management of acute and chronic wounds although the evidence about specific wound situation that benefit most is still under discussion. Clinically it is much easier to apply NPWT sometimes than to force a wound closure. This and the problem that the exact effect on wound healing is difficult to measure in daily routine are always criticized.

All those who are familiar with NPWT know the benefits for the patients and for wound healing. The benefits for the patients are that NPWT is a stable and clean bandage for almost every part of the body that allows a good management of the exsudat. The benefits for wound healing is that NPWT promotes wound healing by increasing local perfusion, eliminating tissue edema, drawing wound edges together, removing exudates and proinflammatory cytokines, inhibiting bacterial growth, and promoting cell hyperplasia.

Analysis of the Germany DRG-Statistics from 2005 to 2014 showed a substantial increase in the use of NPWT decade for hospitalized patients. NPWT has a fix role in treatment of stage IV pressure ulcer at sacrum or ischium, pyothorax, infection and inflammation due to internal joint prosthesis or due to internal fixation device and diabetic foot syndrome. This study had had appropriate ethical approvals.

There is some concern regarding NPWT safety in outpatients which is addressed by some disposable NPWT systems. Economic aspects depend on reimbursement structures and might be different in each country.

**Abolishment of venous reflux**

Alfred Obermayer

**Introduction:** There is general agreement among phlebologists worldwide: ultimately the cause of a venous ulcer is the high pressure in a superficial veins straining the microcirculation of the skin.

By Duplex you may investigate a lot of parameters such as the exact position of the vein, its diameter, thrombosis or not, direction and velocity of flow etc. By Duplex you are not able to measure the pressure, but you are able to detect the source of the local venous hypertension.

**Methods:** In addition to usual routine duplex examination, we use the “sourcing-technique” to detect responsible superficial reflux routes connect with the ulceration. As a provocation manoeuvre, manual compression and release of the ulcerated area is performed to follow the responsible venous reflux routes from the ulcer to its proximal origin.

We differentiate between two types of reflux: Axial reflux in a classic pattern exists when GSV reflux or insufficient medial calf perforators lead to a medial ankle region ulcer, or SSV to the lateral ankle. Crossover patterns are those with “extraterritorial” ulcer locations.

The examination is performed from distal to proximal with the patient in a standing or sitting position.

**Results:** It is surprising that lateral located ulcers are powered cross over in 46% by GSV, medial ulcer in 11% by SSV. 20% of ulcer patients show no visible varicose veins.

**Conclusions:** Sourcing is very helpful in identifying the responsible terminal reflux route of venous ulcers. Especially in case of PTS and mixed ulcers this technique is very useful.
VASCULAR ANOMALIES

Use of multiple sclerosant agents in venous-lymphatic vascular malformation management: a world in endovascular confusion and chaos
Wayne Yakes

Vascular Malformations constitute the most difficult diagnostic and therapeutic entity that can be encountered in Vascular Medicine. Treatment has migrated from surgery (due to the morbidity of the procedure itself and its inherent high recurrence rate), to endovascular sclerotherapy procedures. In articles contrasting treatment of low-flow malformations comparing bleomycin and ethanol, Zhang et al (Exp Ther Med 2013; 6:305-309) report a 138-patient series in which 95% of patients (71 of 75) were cured or had markedly effective treatment with absolute ethanol. In the bleomycin group, 65% of bleomycin treated patients (41 of 63) were deemed effective, as there were NO cures or markedly effective treatments in the bleomycin group, which was statistically significant. The ethanol group had 14 cases of necrosis in 75 patients, and the bleomycin group had 5 causes of skin necrosis of 63 patients. Therefore, the use of bleomycin is not immune to swelling or necrosis, as are the rest of sclerosing embolic agents.

In summary, the literature states unequivocally the superiority of absolute ethylene in the treatment of low-flow malformation. The vast majority of publications state greater than 90% efficacy. Other sclerosants (bleomycin, polidocanol, sodium tetradecyl sulfate, OK432, sodium morrhuate, doxycycline) show a consistent 60%-80% efficacy range. Further, the literature is clear that these second-tier sclerosing embolic agents are not immune to causing necrosis.

The retrograde vein approach with single outflow vein physiology of massive vein aneurysms as a curative treatment strategy for yakes Type IIb AVMs, Type IIIa AVMs, & Type IIIb AVMs
Wayne Yakes

To evaluate the role of Retrograde Vein and Direct Puncture Retrograde Vein Endovascular Repair of Large Peripheral AVMs.

Eighty-seven patients (45 males, 42 females; age: 14 - 72, mean age: 27 years) presented for repair of AVMs involving head and neck, shoulder, chest wall, intra-thoracic, abdominal, renal, pelvic, buttock, and extremities. Ethanol and ethanol/coils were the embolic agents used. Retrograde transvenous catheterizations and vein direct puncture retrograde vein approaches were used in all patients. Eighty-five of 87 patients are cured at long-term follow-up (f/up: 14 months to 138 months; mean: 42 months) and 2 patients’ therapy is ongoing. Complications include 1 pelvic AVM post-Rx small bleed not requiring transfusion; 1 pelvic AVM coils eroded into bladder wall removed uneventfully via trans-urethra endoscopy; 2 infections treated with antibiotics; 2 patients’ coils superficially eroded and uneventfully removed; and 1 patient subcutaneous hematoma removed (7/87 patients; 8% minor complications).

Retrograde vein and direct puncture vein access and embolization of AVMs in many anatomic locations have proven curative at long-term follow-up of AVMs in multiple anatomic locations with a low complication rate. Reproducible and consistent results of this technique have been reported by Yakes (1990) et al, Jackson (1996) et al and Cho (2008), et al. In the Yakes AVM Classification System, these approaches can routinely effect AVM cures in Yakes Types I, IIa, IIIa, and IIIb.

Acquired peripheral AVFs/AVMs: a degenerative and reactive disease of the vein walls: diagnosis & treatment
Wayne Yakes

12 patients (4 males, 8 female; age range 47-84 years; mean age: 66 years) presented with acquired peripheral arteriovenous fistulation of veins causing swelling and venous hypertensive changes in the lower extremities and left upper extremity. All presented with enlargement and swelling of a left lower extremity. Additionally, 1 patient had enlargement of her left buttock; 1 patient had bilateral lower extremity severe swelling with venous stasis changes in the legs; 1 patient had gross edema of the left upper extremity; 2 patients had non-healing venous stasis ulcers complicated with cellulitis; and 1 patient had a left femoral fracture that was surgically treated in previous years and, due to a spine injury, was paraplegic. 2 patients with bilateral acquired pelvic AVFs presented in cardiac failure (cardiac outputs at 18 l/min), renal failure, and hepatic failure. All patients had great difficulty with ambulating. No patient had a history of blunt or penetrating trauma. All patients were discovered to have acquired (non-congenital) extensive AVF in the pelvic, groin, leg, thigh and left shoulder; 4 patients had major venous chronic occlusions. After treating their AVF endo-vascularly, all patients had resolution of their swelling despite the venous occlusions. The non-healing ulcers totally healed. 11 of 12 patients underwent endovascular vein occlusion procedures for closure of their lesions. 1 patient underwent stent placements for cure of the left subclavian AVF (range follow-up: 13-48 months; mean 25 months). No complications occurred. 1 patient in severe cardiac, hepatic, and renal failure, died.
Bauerfield Award 2015/17 - Elastic compression elicited beneficial cardiovascular effects: a complex clinical study in healthy, lymphedematous and lipodematous individuals
Gyozo Szolnoky

Lipedema and secondary leg lymphedema are associated with increased aortic stiffness. Our earlier studies found that knee-length light compression reduced pulse wave velocity of healthy probands causing positive cardiovascular effect.

Our research group aimed to assess left ventricular (LV) rotational mechanics by three-dimensional speckle tracking echocardiography (3DSTE) in lipedema (n=25), bilateral secondary leg lymphedema (n=26) patient groups and in selected lines of investigation among age- and gender-matched healthy controls (n=54). Furthermore 15 healthy volunteers underwent 3DSTE without and with compression class 1 (ccl 1) (18-21 mmHg) sports socks subsequent to standardized physical exercise. LV apical rotation (9.61 ± 4.25 degree vs. 6.40 ± 2.63 degree, P<0.05) and LV twist (13.83 ± 4.89 degree vs. 10.04 ± 3.56 degree, P<0.05) are impaired in lipedema patients as compared to matched controls, similar alterations in lymphedema are missing. Moreover, in some lipedema and lymphedema patients severe LV rotational abnormalities could be detected. Lipedema-associated impaired LV apical rotation and twist assessed by 3DSTE could be a novel differential diagnostic point between lipedema and lymphedema. The application of ccl 2 (23-32 mmHg) made-to-measure pantyhoses resulted in altered LV rotational mechanics in patients with secondary leg lymphedema. The use of sports socks interfered with LV rotation measured with 3DSTE of healthy probands taking part in physical exercise. Lipedema is more often associated with LV rotational abnormalities than secondary leg lymphedema. LV rotation could be significantly influenced by the application of ccl 2 pantyhoses. Sports socks have systemic cardiovascular effects.

UIP PLENARY 2
Phlebology: to be or not to be a speciality
Jean-Jerome Guex

Phlebology is not a worldwide recognized specialty, sometimes it may be a subspecialty, or a University diploma under the auspices of an actual specialty (vascular surgery, Dermatology, Vascular Medicine). However, Phlebology does exist, but it faces a number of challenges: It has a specialized field of competency which is of much interest for official specialties too. The number of venous patients increases because population is aging. New technologies challenge classical ones. New technologies are released and widely used before recommendations are published.

Training in new technologies is mostly carried out by the industry. There is a need for quality control of training and knowledge. The Union Internationale des Médecines Spécialistes (UEMS, EU official body based in Brussels) has created in 2015 a Multidisciplinary Joint Committee on Phlebology (MJCPh) to deal with these issues. The first tasks of the MJCPh was to analyze the current status of phlebology, then to create a European Board of Phlebology (EBPh) able to certify proficiency in Phlebology. The idea was not to offer a specialty diploma in Phlebology since, according to the rules, the specialty can’t exist yet in Europe. But to offer a Competency diploma in Phlebology (CDP) (complete cursus) or a Competency Diploma in Phlebology Procedure (CDPP) (procedure by procedure). CDP and CDPP will be offered to MD with or without speciality but with differences in the cursus of the competency. The European Training Requirements (ETR) have been voted by the UEMS General council in October 2017 and are now an official certification.
Methods:

Endovenous laser therapy for greater saphenous vein (GSV) insufficiency is relatively new method of treatment only recently made available in Iran. This is the first long-term randomized trial comparing EVLT with high ligation of saphenous vein (HLS) in Iranian population. Sixty-five patients met the inclusion criteria and were divided in a homogenous treatment groups of EVLT (n=30) or HLS (35). Clinical severity, etiology, anatomy and pathophysiology (CEAP) classification and Aberdeen Varicose Vein Symptom Severity Score (AVSS) were used to determine the disease severity and symptoms before and after the procedure in both groups outcome was measured by the rate of recurrence as shown in Doppler ultrasonography evaluation. Follow-up was conducted 1 week and 3,6,12 and 18 months after intervention. The occlusion rate of GSV was similar was similar in both groups (93.6% for EVLT, 88.3% for HLS) at 18 months of follow-up. The median CEAP score showed a dramatic decrease in both groups after 1 week which was sustained for the rest of the study. The Aberdeen Varicose Vein Symptom Severity score was significantly lower in the EVLT group at 12 and 18 months of follow-up. There was no significant difference in patient satisfaction in both groups. Our findings show that EVLT may offer a better long-term relief of symptoms. This, alongside its better cosmetic outcome, and less invasive anesthesia requirement may make it the favorable choice for treatment of GSV insufficiency.

Laser ablation of great saphenous vein versus high ligation: long-term results, an Iranian experience
Mohamad Mozafar
Shahid Beheshti Medical Science University, Iran

Results:

Endoscopy was previously attempted for arterial imaging. We aimed to optimize modern endoscopes for phlebological applications. A range of Karl Storz endoscopes (Germany) were used to assess applications in venous system. A protocol was developed to use saline irrigation to flush the blood from target veins to allow visualisation. Veins were accessed at different levels using sterile techniques and endoscopy was performed.

Endoscopy in phlebology: endoscopic imaging of venous system and endovenous procedures
Kurosh Parsi

Conclusions:

Endoscopy can assist with assessment of May-Thurner syndrome and can help obtain a realistic understanding of blood and foam rheology. Endoscopy can be used to guide endovenous procedures.

Deep vein thrombosis, deep vein sclerosis and deep vein fibrosis: time to bury the term “chronic venous thrombosis”
Kurosh Parsi

Background: To characterize and differentiate acute venous thrombosis from the following entities: 1. Sclerothrombus (thrombus formed following sclerosant exposure), Sclerocoagulum (trapped blood following sclerotherapy) and Deep Venous Fibrosis (DVF, the so called “chronic venous thrombosis”).

Methods: Sclerothrombus was assessed using rotational thromboelastometry (ROTEM), scanning electron microscopy (SEM) and fluorescent microscopy. Whole blood (WB) samples were incubated in vitro with sodium tetradecyl sulphate (STS) or polidocanol (POL) at a range of concentration (0%, 0.01%, 0.035% and 0.075%). Samples were left until a clot was formed (3hrs for acute clots and >10d for chronic clots). Samples weights were measured and samples were prepared and analysed by SEM. Deep vein fibrosis was assessed by endoscopy in a patient with May-Thurner syndrome. The left iliofemoral vein was accessed. Endoscopy (Karl Storz, Germany) was performed under continuous saline infusion.

Results: Sclerothrombus showed mesh-like distribution with multiple branches, an increase number of platelet microparticles (PMPs) and increased polyhedrocytes with both STS and POL and the fibrin fibers were thick with STS and thin with POL. Sclerocoagulum showed a mesh-like distribution with multiple branches, thick fibers and a reduced number of platelets. The spontaneous clot showed a linear distribution with scarce branching, thin fibers, an increase number of platelets and polyhedrocytes. Endoscopy demonstrated fibrotic occlusion of the iliofemoral vein with no evidence of a fibrin thrombus.

Conclusions: Sclerothrombus and sclerocoagulum showed different microscopic characteristics and different degrees of clot stability compared to spontaneous fibrin thrombus. Sclerothrombus derived from POL show more features of stability than sclerocoagulum derived from STS. Acute sclerothrombus showed more features of stability than spontaneous thrombus. Sclerocoagulum showed less features of stability than both sclerocoagulum and spontaneous clots. Chronic occlusion in deep veins is a fibrotic process and is best called ‘deep vein fibrosis (DVF). The term “chronic venous thrombosis” should be abandoned.
Weight loss seems to be crucial in the successful management of chronic edema but diet and exercise do not often produce sustained improvements. Bariatric surgery seems to offer a more lasting effect. The preliminary results of a small UK study of the effect of bariatric surgery on chronic edema will be presented.

Clinical features of lymphedema in children and adolescents
Vaughan Keeley

Primary lymphedema in children and adolescents is rare but in recent years there has been a greater understanding of the different phenotypes and their underlying genetic causes. The session will describe a practical approach to the diagnosis of lymphedema in children and it varied presentation with clinical examples. The role of genetic testing will be discussed. The recently set-up European Reference Network for rare vascular diseases (VascERN) includes a specific working group on pediatric and primary lymphedema. This work of this group will be described.
POST THROMBOTIC SYNDROME

SOX and ATTRACT trials should NOT result in a change in clinical practice
Fedor Lurie

SOX and ATTRACT are the largest randomized clinical trials (RCT) comparing treatment options for DVT in regards to its chronic sequella. At the first glance they are very well designed studies. However a more detailed analysis reveals substantial and fundamental flaws in both of these studies. Each of them has its own subject-specific deficiencies. Both of them share two fundamental flaws that potentially invalidate their conclusions.

The first is inclusion of patients with pre-existed chronic venous disease (CVD). Up to 50% of included patients had pre-existed disease (based on Villalta score), making post-treatment assessment of the presence of post-thrombotic syndrome (PTS) invalid.

The second is the flawed definition of the studied condition. Pursuing simplification of trial logistics and cost savings, both trials replaced the pathologic definition of secondary (postthrombotic) chronic venous DISEASE with a syndromatic definition of postthrombotic SYNDROME. Instead of defining disease by the underlying pathology, certain severity scores have been used, such as the Villalta scale. As a result, a patient with manifestations that are not severe enough would be classified as not having PTS. Therefore, patients with fewer symptoms but severe underlying pathology (e.g., iliac vein occlusion) are classified as having a perfect treatment outcome, while patients with complete clot resolution, but pre-existed CVD are classified as the failure of treatment. Although such approach may be justifiable for observational studies, in RCTs that compare different treatment options this is unacceptable. Making clinical recommendations based on these trials should not be done until their results are replicated.

PTS: why Villalta score has been a failure
Thomas Urbanek

Despite the performed research, we are still not able to predict who of the patients after the DVT episode will develop post-thrombotic syndrome (PTS). In the aspect of the proper follow-up of the DVT patients, the proper evaluation tool has to be used. The creation of the Villalta Score approved by the International Society on Thrombosis and Haemostasis as well as many other societies and researchers lead to the very common use of this scale in the post DVT patient population evaluation. The wide range of the clinical symptoms and signs potentially related to the PTS occurrence, as well as various clinical advancement of this late DVT sequelae make both PTS diagnosis as well as its severity assessment extremely difficult. The limited number of the factors analysed (e.g. exclusion of the venous claudication), the lack of the pathological and anatomical evaluation as well as the potential influence of the previous primary chronic venous disease presence on the reported results create significant problems with both: PTS diagnosis as well as PTS severity assessment, if based on Villalta scale. The better understanding of the PTS pathology as well as the novel modalities proposed in the PTS treatment, especially if obstructive pathology is present, require the novel and clinically validated tool for the proper PTS assessment.

In vivo follow-up of revascularization in deep venous thrombosis investigated with contrast ultrasound agent
Christina Jeanneret-Gris
Department of Angiology University Clinic of Internal Medicine, Bruderholz, Switzerland

Background: The aim of this study was to assess re - vascularization of venous thrombosis with contrast enhanced ultrasound agent (CEUS).

Methods: 31 patients (24 M, 7 F) with acute occluding deep venous thrombosis were investigated using the clinical score described by Wells et al (median 6.0, IQR 1.0) and with duplexsonography. The most proximal part of the thrombus was investigated after injection of 5 ml of contrast agent (sulphur hexafluoride = Sonovue®) into the corresponding foot - vein. The acoustic intensity (in Decibel) was measured during acquisition time in manually defined regions of interest (ROI), i.e. the centre and the walls of the vein as well as the adjacent artery. The patients were investigated at the time of diagnosis, after 3 weeks and 3 months.

Results: Median (IQR) of the relative intensity differences (baseline – peak) at visit 1, 2 and 3 amounted to 3.3 (2.65), 2.9 (5.5) and 12.4 (14.8) (P=0.03 for comparison of visit 1 and 3) in the centre of the vein and 4.5 (6.5), 7.1 (7.7) and 11.9 (13.9) in the vein wall (P=0.049, visit 1 and visit 3).

Conclusions: CEUS might be a new approach to investigate recanalisation of acute deep venous thrombosis in follow-up studies.

Secondary varicose veins in patients with deep venous thrombosis or when are we allowed to operate on secondary varicose veins?
Dominik Heim


Debate: Since the Villalta scale is invalid published PTS trials are also invalid: FOR
Christopher Lattimer

Sabina Villalta first published the scale with her supervisor Prandoni as an abstract in 1994. Since then the Villalta scale (VS) has been validated extensively for use in the post-thrombotic syndrome (PTS). Currently, it is the gold standard measuring instrument for studies examining the incidence, natural history and effects of intervention. However, its gold standard position may be over rated. Major clinical trials have relied on the VS as an outcome measure. For example the ATTRACT and SOX trials. Interrogation of the VS reveals major weaknesses. In consequence, conclusions from studies on interventions designed to reduce the incidence of PTS may have less value that originally proposed. The VS assesses 5 patient reported symptoms (cramps, itching, pins and
needles, leg heaviness and pain) and 6 physician reported signs (pre-tibial edema, skin induration, hyper-pigmentation, venous ectasia, redness, and pain during calf compression). Each item has 4 possible points (0, 1, 2, 3) representing none/minimal, mild, moderate and severe, respectively. The final score is out of a total of 33 points. Whilst the VS has an advantage of simplicity there are 5 major drawbacks. (i) Non-specific, with most items in common with superficial venous disease, ii) Items excluded, like venous ulceration, claudication and collateral development, iii) Poor definitions, like venous ectasia, redness and pre-tibial edema, iv) Cardinality, because biological units are unrealistic and v) No advantage, for example when compared to the venous clinical severity score. This debate proposes that the Villalta scale is invalid in the assessment of PTS.
SCLEROTHERAPY

Optimization of sclerotherapy and thermal ablation techniques to reduce the risk of pigmentation
Claudine Hamel-Desnos

The hyperpigmentation after sclerotherapy or thermal ablation (TA) of varicose veins is a benign side effect, often transient, whose rate of occurrence is very variable in the literature, but which can create dissatisfaction of the patient.

The pathophysiology of this phenomenon is not completely known, but this would be secondary to the inflammatory process of the treated vein causing wall permeability. Combined with blood stasis, this permeability promotes the passage of red blood cells in the nearby tissue. Secondly, there is a production of hemosiderin and then a ferric brown pigment is located in the dermis, causing stimulation of epidermal melanocytes.

To prevent excessive inflammation, a pre-treatment assessment including a clinical and ultrasound examination is of paramount importance to avoid omitting an underlying reflux; then the right dose at the right place must be applied. We have seen in our clinical experience that not only an overdose but also an underdose can cause an excessive inflammatory reaction. For sclerotherapy the top-down technique (French school) seems to cause less inflammation than other techniques and concentrations are adapted to the diameter of the venous segment. For TA the correct energy must be applied (optimal LEED- Linear-Endovenous-Energy- Density could be 80 Joules/cm for EndoVenous-Laser-Ablation).

Conclusions: hyperpigmentation after endovenous treatments is a complex phenomenon for which, even if it is not the only criterion, the quality of the gesture plays an important role. The respect of the good practices and the use of the right dose will help to limit the risk of pigmentation.
STATE OF THE ART PLENARY

The Discord Outcome Analysis (DOA)
Christopher Lattimer

Validated outcomes are essential in the assessment of interventions treating superficial venous insufficiency (SVI). The current randomised clinical trials (RCTs) report on 3 separate outcome domains: quality of life, venous clinical severity and an ultrasound assessment. These are assessed using the Aberdeen varicose vein questionnaire (AVVQ), venous clinical severity score (VCSS) and saphenous vein occlusion rates, respectively. A positive change defines improvement. All 3 domain changes can be combined using a Venn diagram. As a result there are 7 positive outcome possibilities. If success is defined as an improvement in all the 3 domains then there is only a 1 in 7 chance of a successful result. Interrogation of the 6 out of 7 failures defines the discord outcome analysis (DOA).

At long-term follow-up, current assessments become less useful. For example: 1) The AVVQ includes the deterioration or improvement of the contra-lateral untreated/treated leg. This confounds assessment of the treated study leg. 2) The VCSS is weighed favourably in patients with venous ulcers (40%) which form <5% of the treated population in RCTs on SVI. Furthermore, introduction to maintenance treatment with compression stockings incurs 3 penalty points on the VCSS although the clinical appearance of the leg and symptoms may improve. 3) Using ultrasound saphenous occlusion rates, long term recurrence is frequent (>50%) due to missed reflux elsewhere or progression of the disease.

This invalidates the use of technical outcomes in the long term.

The DOA is proposed as a mandatory reporting standard to improve transparency in all comparative RCTs.

Challenges in updating the International Guidelines on CVD
Andrew Nicolaides

An update of the International Guidelines on CVD is currently in progress. Considerable advances have been made towards a greater understanding of the pathophysiology and better management of CVD. A number of challenges face the updating faculty. The SymVein publication has changed our approach to the assessment and management of CVD in relation to symptoms. Symptoms are responsible for what patients feel and what they complain of. Unless we relieve the symptoms, patients will not always be satisfied. Much is needed to improve current classifications in relation to symptoms. CEAP is based on signs where “S” is used for symptomatic and “A” for asymptomatic ignoring the severity of symptoms. VCSS uses only 3 marks out of a possible total of 30 for presence and severity of symptoms. We are now aware of anatomic and haemodynamic factors associated with increased severity and progression of CVD that need to be considered in the clinical decision making process. Controversy now surrounds the value of compression with differing recommendations on either side of the Atlantic. New systematic reviews on the effect of different venoactive drugs on individual symptoms have been published with improved level of evidence that the clinician needs to be aware of. The number of randomized controlled trials (RCT) comparing different methods of treatment of VV increased from 64 to 156 in the last 4 years. The recurrence rate appears to be the same for most methods of venous ablation.

An update on ACCP VTE Guidelines
Clive Kearon

It takes about 3 months to complete “active treatment” of venous thromboembolism (VTE). Consequently, VTE should generally be treated for either 3 months or indefinitely. The decision to treat indefinitely is dominated by the risk of recurrence, and secondarily influenced by the risk of bleeding and patient preference.

VTE provoked by a reversible risk factor has a low risk of recurrence and is usually treated for 3 months. VTE associated with active cancer, or a second unprovoked VTE, has a high risk of recurrence and is usually treated indefinitely. The decision to stop anticoagulants at 3 months or to treat indefinitely is more finely balanced after a first unprovoked proximal DVT or pulmonary embolism (PE). Indefinite anticoagulation is often chosen if there is a low risk of bleeding, whereas anticoagulation is usually stopped at 3 months if there is a high risk of bleeding.

The decision to continue anticoagulation indefinitely after a first unprovoked proximal DVT or PE is strengthened if the patient is male, the index event was PE, and/or D-dimer testing is positive 1 month after stopping anticoagulant therapy. Conversely, the argument for indefinite anticoagulant therapy is weaker in a women with a DVT who has a negative D-dimer 1 month after stopping anticoagulants. The lower risk of bleeding and convenience of direct oral anticoagulants compared with vitamin K antagonists may also tip the balance in favor of indefinite therapy in select patients with unprovoked or cancer-associated VTE.

Guidelines of the American Venous Forum on venous and lymphatic disorders
Peter Gloviczki

The most frequent interventions to treat symptomatic varicose veins and more advanced chronic venous insufficiency (CVI) includes endovenous thermal ablation (EVTA) using radiofrequency (RA) or laser EVLT, ultrasound guided foam sclerotherapy (UGFS), cyanoacrylate embolization (CAE), mechanical occlusion with chemically assisted ablation (MOCA) and surgery. Guidelines of the American Venous Forum (AVF) and the Society for Vascular Surgery (SVS) on management of venous varices and CVI (Gloviczki et al. J Vasc Surg 2011;53(Suppl):2S-48S) and on the management of venous ulcers were published (O’Donnell TF Jr et al. J Vasc Surg 2014;60(Suppl):3S-59S). AVF/SVS documents reported results of new treatments (Gloviczki et al. J Vasc Surg Venous Lymphat Disord. 2017 May;S3(3):378-398.) and extensive update with 300 guidelines was published recently in the Handbook of Venous and Lymphatic Disorders, 4th Ed. (Gloviczki, Dalsing, Eklof, Luce, Wakefield, Gloviczki, CRC Press, 2017). Based on current evidence, intervention results in superior immediate and mid-term health outcomes than conservative management, in terms of symptom improvement and improvement in quality of life (QoL). Endovenous interventions have less early complications, peri-procedural pain and disability. Current guidelines therefore recommend against compression therapy as the primary treatment of symptomatic uncomplicated varicose veins if the patient is a candidate for saphenous vein ablation (level 1, evidence B), and recommend EVTA and UGFS over surgical ablation of the saphenous vein for the treatment of chronic venous disease (CVD) (level 1, evidence B). Treatment of chronic venous obstructions with stents is currently recommended based on moderate level of evidence.

ACP Guidelines for cyanoacrylate closure
Stefania Roberts, Ken Myers

Victoria Vein Clinic, East Melbourne, Australia

A group of 10 doctors from Australia convened to obtain a consensus on the use of cyanoacrylates in Australia. The indications, contraindications, and technique of administration of the three available cyanoacrylates were discussed in an attempt to standardise the use and administration of adhesives across Australia and New Zealand.
**VASCULAR ANOMALIES**

**Surgical tips for hand arteriovenous malformations**

Dong-ik Kim

*Division of Vascular Surgery, Samsung Medical Center, Sungkyunkwan University School of Medicine, South Korea*

Congenital arteriovenous malformations (AVMs) are a primitive type of congenital vascular malformation that forms as the residual remnants of a developmental arrest in the early stage of embryonic life. AVMs of the hand display various clinical presentations, including heaviness, a pulsating mass, a sensation of heat, pain, bleeding, ulceration and necrosis. Furthermore, hand AVMs are likely to cause cosmetic complications and functional impairment or fracture. A large shunt can create hemodynamic alterations leading to cardiopulmonary overload and congestive heart failure.

The lesions may or may not become clinically evident from birth to adulthood. Trauma, surgery and hormonal influences may cause the lesion to expand hemodynamically.

Hand AVMs are unusual and when they are present, they are difficult to treat because of the necessity to maintain function and there is a high complication rate after treatment. The treatments of ATMs of the hand include conservative treatment, embolo/sclerotherapy, partial excision and amputation; however, there is currently no consensus for the treatment of AVMs of the hand.

We will present the surgical tips for hand AVMs during the Congress.

**Venous malformations: treatment with foam sclerotherapy**

Pier Luigi Antignani

*Director, Vascular Center, Nuova Villa Claudia, Rome, Italy*

According to the last classification of vascular malformations, we can identify the fast-flow and the slow-flow lesions such as Capillary malformation-CM (port wine stain, telangiectasia, angiokeratoma), Venous malformation (VM), Lymphatic malformation (LM) and Combined vascular malformation (CVM, CLM, CLVM, CAVM, CLAVM).

In the clinical evaluation of patients, the physical and echo-duplex examinations should include careful assessment (inspection, palpation, auscultation) of the lesion(s) as well as the arterial, venous and the lymphatic systems.

Clinical examination of the involved area should include assessment of the size, volume, symmetry, co-existing soft tissue or bony hypertrophy or atrophy. Clinical progress should be documented by serial photography.

Sclerotherapy is a treatment that has been effective in treating venous malformations and lymphatic malformations with low flow. The treatment consists of a percutaneous injection of a substance into the abnormal veins of the venous malformation according to standardized method.

Case reports: 179 cases with different kinds of malformations (AVM, CM, VM, LM) and 12 children <4 years old were examined during the last year. We treated 67 patients with echo-guided foam sclerotherapy.

All patients tolerated the procedures very well. Patients had excellent to good immediate outcomes. All had clinical and duplex scan follow-up assessments, showing complete disappearance of lesions or near complete disappearance.

In conclusion, percutaneous foam sclerotherapy has been developed as a minimally invasive treatment modality and it is an excellent substitute for ethanol, especially in high-risk, localized VM lesions.

**How to manage the soft tissue injury caused by embolo-sclerotherapy**

Dong-ik Kim

*Division of Vascular Surgery, Samsung Medical Center, Sungkyunkwan University School of Medicine, South Korea*

Despite the advances in vascular medicine, congenital vascular malformations (CVMs) are still a challenge among the many vascular diseases. Complete eradication of the nidus of a CVM has been known to be the therapeutic option for achieving a potential cure. Yet, complete surgical eradication of the nidus of a CVM is rarely possible for most of the infiltrating type of CVMs, except for the small, localized and surgically accessible lesion. Blocking the route for embolo/sclerotherapy by ligation of the feeding arteries and partial excision of the nidus might interfere with embolo/sclerotherapy, and the outcome is then worsened.

Once the accurate diagnosis of the CVM is established, further decisions should be referred to the multidisciplinary team of the CVM. The multidisciplinary team might be made up of special departments related to the management of CVM: vascular surgery, plastic and reconstructive surgery, orthopedic surgery, interventional and diagnostic radiology, physical medicine and rehabilitation etc. Embolo/sclerotherapy may be an effective treatment method because no recurrence has been observed during the relative long-term observation period and the morbidity was acceptable. Yet, it is not well known what type of vascular malformation is more susceptible to complication such as soft tissue injury or neuropathy after performing embolo/sclerotherapy.

We will present how to manage the soft tissue injury caused by embolo-sclerotherapy during the Congress.

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In conclusion, percutaneous foam sclerotherapy has been developed as a minimally invasive treatment modality and it is an excellent substitute for ethanol, especially in high-risk, localized VM lesions.
Pigmented purpuric dermatoses and venous disease
Pooja Kadam

Background: To investigate the influence of haemostatic abnormalities, coagulation disorders and venous insufficiency in patients with pigmented purpuric dermatosis (PPD).

Methods: Over a twelve-year period (July 2002-June 2014), 65 patients with a provisional diagnosis of PPD were investigated for haemostatic abnormalities. Diagnosis of PPD was made clinically and was confirmed by histopathology when required. Platelet function was assessed by platelet function analyser 100 (PFA-100), light transmission aggregometry (LTA) and Multiple impedance aggregometry. Coagulation was assessed by conventional clotting times and functional clotting factor assays. Venous incompetence was assessed by duplex ultrasound. Patients were advised to discontinue platelet inhibitors and non-steroidal anti-inflammatory drugs (NSAIDs) and haemostatic modifying supplements including fish oil and vitamin E for four weeks. Clinical and laboratory assessments were repeated following this period. Minimally invasive venous interventions (endovenous laser ablation and ultrasound guided sclerotherapy) were performed to treat the underlying venous disease.

Results: Venous incompetence was found in 78.1% of patients. Haemostatic abnormalities were found in 59.4% and decreased platelet function was observed in 51.6%. Fish oil or other haemostatic modifying drugs and supplements were consumed by 68.8% of patients. 1 patient who did not complete the study investigations was excluded.

Conclusions: Platelet and coagulation abnormalities contribute to the aetiology of PPD in patients with venous disease. Intake of fish oil and platelet modifying drugs contributes to the pathogenesis of PPD.

Dermatological manifestations of venous disease NOT included in CEAP
Kurosh Parsi

Background: CEAP classification was introduced to guide physicians in assessing the severity of venous disease. I aimed to identify dermatological manifestations of venous disease not included in CEAP classification.

Methods: Review of CEAP classification by the author

Results: The definition of ‘reticular veins’ in CEAP classification is wrong. Reticular veins are not synonymous with ‘venulectasias’ and in fact reticular veins form the normal sub-dermal venous plexus. Reticular veins are also not necessarily synonymous with ‘feeder veins’ as feeder veins can be varicose tributaries. Pigmented purpuric dermatoses (PPD), acroangiodermatitis (AAD) and superficial thrombophlebitis should be included under C4A. Livedo vasculopathy (LV) should be included under C4B.

Conclusions: CEAP classification requires a revision and correction.
STATE OF THE ART PLENARY

Humanitarian varicose vein treatments in Central and South America – A personal journey

Stefania Roberts¹, Miguel Angel Huaman Rios²

¹Victoria Vein Clinic, Melbourne, Australia; ²Sanatorio di Milagro, Argentina

Untreated sequelae of chronic venous insufficiency leads to impairment on quality of life and ability to work. Central and South America have decreased access for their patients to obtain any treatment for their chronic venous disease.

Over the past two years we have been part of a Humanitarian Mission in Matapalga, Nicaragua lead by Dr Nick Morrison as the Amigos de Salud (friends of health). Here a group of doctors from the USA, Canada, UK, Italy, Argentina and Australia work conjointly with vascular sonographers, nurses and any extra hands that will volunteer their time to assess, treat and manage patient’s in the region. We treat patient’s with compression garments, lymphatic drainage, endovenous laser ablation, radiofrequency ablation, VenaSeal and Ultrasound Guided Sclerotherapy to improve the health of their lower limbs.

This year Dr Huaman, myself and two doctors from Australia will be working as the Austral Humanitarian Mission in Tucuman, Argentina to assess and treat patient’s venous insufficiency via compression stockings, endovenous laser ablation, radiofrequency ablation, Venablock, Veinoff and ultrasound guided sclerotherapy.

Giving up one’s time to give back to humanity is priceless. A big thank you to trade for donating Venosan stockings, laser fibers, radiofrequency devices, sclerosants and cyanoacrylate to make this possible.

Foam sclerotherapy – state of the art

Philip Coleridge-Smith

The British Vein Institute, London, UK

Foam sclerotherapy has become widely used for the treatment of varicose veins. It is also often used for the treatment of venous malformations and pelvic varices.

Several different methods of treatment have been described with foam sclerotherapy. Some techniques have been rigorously evaluated and others have remained the author’s personal method.

The outcome of foam sclerotherapy has been reported to have widely differing success rates. In this presentation, I review a number of strategies that have been published and compare the reported outcomes of treatment.

A limited number of randomised clinical trials of foam sclerotherapy have been published, some with satisfactory outcomes for foam sclerotherapy. Others have very poor results. I analyse the reasons for success and failure of this method.

Update on classification for antiphospholipid syndrome

Doruk Erkan

Barbara Volcker Center for Women and Rheumatic Diseases, Hospital for Special Surgery, Weill Cornell Medicine, New York, USA

Antiphospholipid Syndrome (APS) is characterized by thrombosis and/or pregnancy morbidity in patients with persistent antiphospholipid antibodies. Classification of APS currently is based on clinical and laboratory criteria identified in the “Sapporo Classification Criteria”. Given significant limitations of the current classification criteria, e.g., not capturing the full spectrum of clinical manifestations of disease, an international multidisciplinary effort has been initiated to develop new evidence-based APS classification criteria, employing a balance of expert- and data-driven methods. The purpose of new criteria is to identify patients with high likelihood of having APS, and to better standardize patients for APS clinical trials and epidemiologic studies.

Update on clinical applications of venous hemodynamics

Andrew Nicolaides

So far, attempts to correlate venous hemodynamic measurements with symptoms and signs of CVD have produced poor results, probably because of lack of methods to quantitate obstruction. Other confounding factors are three protective mechanisms: (a) the ability of lymphatic drainage to increase 5-10 times in some individuals but only 2 times in others (zero in patients with lymphedema), (b) the variable fibrinolytic activity in blood and tissues and (c) the duration of the venous hypertension (years).

Despite the above, quantitative air-plethysmographic measurements such as VFI in ml/sec (a measure of reflux), ejection fraction of the calf muscle pump and outflow resistance (R in mmHg/ml/sec) can supplement duplex imaging and assign risk more accurately or predict the success or failure of reconstructive procedures. For example, VFI<5ml/min is associated with a low prevalence of chronic swelling (12%), skin changes (19%) and zero ulceration. In contrast, VFI>5 ml/sec is associated with a high prevalence of chronic swelling (46%), skin changes (61%) and ulceration (46%). Thus, the finding of reflux >5ml/sec is an indication for intervention to prevent disease progression.

In patients with deep venous reflux successful valvuloplasty decreases VFI to <5 ml/sec. If VFI is less than 5 ml/sec valvuloplasty has no effect on ulcer healing or relief of symptoms. Also, venous stenting is not likely to be of benefit in the presence of VFI>5 ml/sec and a low outflow resistance (<0.2 mmHg/ml/sec) indicating a well-developed collateral circulation. Such patients can be spared from an unnecessary stent. They are more likely to benefit from valve reconstruction.

Update on genetics of vascular anomalies

Miikka Vikkula

Vascular anomalies are localized defects of the lymphatic and vascular system. They are most commonly cutaneous, but can affect any body part. They are divided according to vessel type into arterial, capillary, venous, lymphatic and combined-complex malformations.

These lesions usually occur sporadically, but sometimes there is an inherited predisposition. Underlying inherited changes have been identified for many, and genetic studies have also led to identify previously unrecognized clinical entities, such as CM-AVM 1 and 2. Patients with an inherited cause for vascular anomaly are characterized by small multifocal lesions, which increase in number with time. We explained this as Knudson’s double-hit theory and need for somatic second-hits. We subsequently hypothesized that somatic genetic mutations could well explain the much more common sporadically occurring forms.

We screened tissues collected from therapeutic resections by RT-PCR or targeted NGS for high sensitivity. We pinpointed mosaic or somatic activating mutations in +/-80% of VMs, 80% of LMs, 50% of CMs, and often also in some combined-complex malformation syndromes. There-
We used in the 3 cases endoluminal laser 980nm, with fiber from 200 to 600nm, and in 8 cases the laser 1470 and the fiber from 200 nm. All the cases were guided by intraoperative U.S., also we performed a pre-operatory arteriography of the lower limbs. A scanogram of the both length show the differences between the ill legs, that contains the diffuse angiomatosis, the pigmentary nevus and the different legs measures and length of these.

In the cases that the patient presents a diffuse pattern of micro arteriovenous fistulae, we usually performed a pre-operatory arteriography and we used to practice the regional segmentary skeletization technique. After the endovenous laser during the immediate post-operatory control we observed that the pre-operatory pattern was disappeared so we conclude that the endovenous laser in the treatment of the KTS helps to close and treat the diffuse microarteriovenous fistulae.

The use of the Foam technique with the vein viewer, was very important in all the cases of recurrences.

**Conclusions:** long term results of the “Regional segmentary skeletization” technique were presented (15-24 years) with good results, and with 3 cm or less difference between the other leg in the pre-operative.
COMPRESSION

Compression in venous ulcers: how does it work?
Hugo Partsch

The ultimate cause for venous leg ulcers is ambulatory venous hypertension due to venous reflux and/or venous obstruction, leading to capillary hypertension, increased extravasation and inflammation.
Compression therapy has two main effects:
1. Reduction of edema formation and inflammation
2. Reduction of venous reflux and improvement of the venous pumping function.

Already light and modest compression pressure achieved by a compression stocking can reduce leg swelling.

Much higher pressures are needed to reduce venous diameters in the upright position which is a prerequisite for a reduction of venous reflux and for an improvement of the venous pumping function during walking. A compression pressure of 70-80 mmHg in the standing position is tolerated only by using stiff, inelastic material, which is applied with a resting pressure of 40-50 mmHg. During walking pressure peaks under the bandage can intermittently occlude incompetent veins thereby reducing venous reflux and increasing the ejection fraction of the calf pump.

During walking, which should be encouraged, higher compression pressures over the calf muscle seem to be more important than a gradual pressure.

There are two main restrictions concerning the use of inelastic bandages:
1. The correct application of such bandages is not easy and needs to be learned and trained. Most of them are applied to loosely.
2. They lose pressure due to edema reduction.

Velcro wraps may overcome these restrictions: They can be applied with adequate pressure after short training by the patients themselves and can be readjusted when getting loose.

Compression in arterial and mixed ulcers
Giovanni Mosti

About 15-20% of patients with venous leg ulcers have a reduced ankle brachial pressure index (ABPI) causing retarded healing.
Compression can improve venous haemodynamics in mixed ulcers but needs to be applied with a reduced pressure in order not to hinderance arterial inflow. In order to define a safe range of compression pressure that does not impede arterial flow we assessed in 25 patients with mixed ulcers: 1) skin flow in the peri-wound area and in the plantar surface of the first toe, 2) toe pressure, 3) TcPO2 on the dorsum of the foot. The measurements were carried out in baseline conditions and after inelastic bandage from the base of the toes to the popliteal area, applied with different pressure ranges of 20-30, 30-40 and 40-50 mmHg.

Finally venous pumping function from the lower leg was measured with bandages exerting reduced pressure not impeding arterial flow.

Compared to baseline conditions skin perfusion increases significantly with a bandage pressure of up to 40 mmHg, toe pressure increases with every pressure step, TcPO2 showed a small but significant increase compared to baseline with a compression pressure between 30 and 40 mmHg.

Finally with a reduced supine pressure of 30-40 mmHg an inelastic bandage is still able to increase the venous ejection fraction from the lower leg and restore it into its normal range.

Compression in inflammatory leg ulcers
Joachim Dissemond

Leg ulcers have very different causes. In addition to modern moist wound therapy, compression therapy is the central part of conservative therapy for many leg ulcers. This is clear to all therapists especially for the indications chronic venous insufficiency and lymphatic diseases. Other indications are often not clear and will therefore not be treated with compression.

Inflammatory leg ulcers are rarely diagnosed diseases. The most well-known of these are manifestations as vasculitis, which, however, also represents a very heterogeneous group with some very different underlying diseases. Other causes include, for example, pyoderma gangrenosum, calciphylaxis, necrobiosis lipoidica or livedoid vasculopathy. In the context of inflammation, similar clinical symptoms occur in these very different diseases. Most of the patients have very painful ulcers on the lower legs, accompanied by erythema and edema. The correct therapy starts with the correct diagnosis. Here it is very important to decide whether a systemic therapy, for example, with immunosuppressants is indicated. Irrespective of this, after the exclusion of contraindications, compression therapy is very important especially for the reduction of edema. Due to the usually pronounced pain, it may make sense to start with low pressure, for example with 20 mmHg.

Although there is so far little scientific evidence for this topic, it reflects current expert recommendations that also in inflammatory leg ulcers compression is an important part of a successful therapeutic regime.

Compression in patients with cardiac failure
Vaughan Keeley

Derby Teaching Hospitals NHSF Trust, Derby, UK; University of Nottingham, Nottingham, UK

Guidelines often recommend that compression is contraindicated in acute/uncontrolled heart failure. In elderly patients with chronic edema, heart failure may be the sole cause or a contributory factor in the development of swelling. In patients with leg ulcers, the coexistence of heart failure also needs to be considered in the decision to use compression.

The clinical history and examination may indicate the presence of heart failure but further investigations such as plasma B-type Natriuretic Peptide (BNP) and echocardiography are helpful in determining the degree and type of heart failure.

The safety of the use of compression may be different in heart failure with reduced ejection fraction and that with preserved ejection fraction. In patients where heart failure is the major cause of edema, appropriate management of the heart failure e.g. with drugs should be the first step. If residual chronic edema remains a problem despite optimum drug management of the heart failure, then, particularly in those with leg ulcers or lymphorrhoea, compression may need to be considered.

In these circumstances modified (reduced) compression is often recommended with advice to discontinue the compression should breathlessness develop.

The use of serial BNP measurements may help in decision-making. A case series of these will be described.

Compression in leg ulcers: the self management issue
Joachim Dissemond

Compression therapy, together with modern moist wound treatment, is the basis for a successful conservative treatment of patients with leg ulcers of various entities. In clinical practice, it is often the patient himself
who applies compression therapies. Many of the patients are not able to reach their own legs and feet due to movement restrictions, such as arthritis, arthrosis or obesity. An adequate compression therapy, especially with bandages, also requires extensive experience and regular training. In daily practice, only few patients can perform a good and adequate compression therapy with bandages.

An increasing trend in various medical fields is self-management with do-it-yourself devices. Beside psychological factors, cost aspects and demographic change, with an expected lack of qualified nursing staff and increasing numbers of elderly patients who need care is becoming more and more important in the future. For the essential important compression therapy of patients with leg ulcers, there exist already different therapy options. The needs, preferences and abilities of the patients should be considered when selecting the individual appropriate system. In particular, for the self-management with compression therapy, the adaptive compression bandages are a good option in patients with leg ulcers during the initial decompression phase, and the ulcer stocking systems (with donning devices) in the following maintenance phase. Self-management is a great challenge in compression therapy for leg ulcer patients. Now increasing good treatment options are available which can be chosen according to individual aspects and preferences of the patients.
Case examples of patients with this condition will be described to illustrate the variety of presentation. Conventional management of any lymphedema present as part of the condition is appropriate. However, research is currently looking into the efficacy and safety of drugs which inhibit the mTOR receptor e.g. sirolimus in the treatment of PROS.

LYMPHATICS

PIK3CA overgrowth spectrum (PROS)
Vaughan Keeley

There are a number of vascular malformation and overgrowth syndromes of which lymphatic malformations and lymphedema can be part. In recent years some of these syndromes have been found to be due to somatic mutations of the PIK3CA gene. These include CLOVES syndrome and some cases of Klippel Trenaunay syndrome. PIK3CA mutations seem to cause a variety of syndromes incorporating overgrowth but with very different phenotypes. To cover this range of presentations, the term “PIK3CA overgrowth spectrum (PROS)” has been coined. PIK3CA is part of the AKT1 / PIK3CA / mTOR pathway which controls the growth of tissues. It is believed that mutations which result in upregulation of the activity of this pathway cause the overgrowth of tissues seen in these syndromes.

LIMRINT in specialist lymphedema services
Vaughan Keeley

The results from 7500 patients in lymphedema services from 5 countries will be described. Data on the case-mix of patients will be described for the whole group and compared between services. The results show significant variation in the types of lymphedema seen in the different services. These differences probably reflect the services provided for patients rather than differences in the prevalence of the different types and causes of lymphedema in the general population. In the UK, services which started in the 1980s / 1990s initially focussed on treating cancer related lymphedema but these have evolved to treat all types of lymphedema, such that cancer related lymphedema is now approximately 30% of the caseload. A similar pattern of evolution may occur in other countries.
VENOUS HEMODYNAMICS AND FLUID MECHANICS

Should shunts assessment be part of any venous mapping?
Massimo Cappelli

First of all, we will define what a venous shunt is, differentiating a direct reflux from an indirect reflux. A shunt is always made up of an escape point a conduit and a re-entry, through perforators in the deep system. Dynamic tests and not squeezing test, elicit a reflux thanks to muscular pump activation, allow us to understand if hemodynamic events fulfill during muscular systolic phase or in diastole or both. Thus the first classification will be SYSTOLIC SHUNT, DIASTOLIC SHUNT, MIXED SHUNT. There are several types of Diastolic shunts according to the pathway of the reflux, but they are not so clinically important, as they are mainly used for studies. The key point is to make evident the VICARIOUS SHUNTS as an expression of functional or organic obstruction at the deep level. They are a sort of natural by-pass, in the superficial network, to pass over the deep obstruction. They must be identified because they have to be spared. They Vicarious shunt appears during the systolic phase, even if not all systolic shunts are vicarious, and we will try to differentiate them.

Volume balance in the calf muscle pump
Fausto Passariello

The most ancient practical double-entry-keeping is anonymous (Genoa 1340), while the first accounting treatises are by Benedetto Cotrugli (Naples 1458) and Fra’ Luca Paciolo (Venice 1494). The term balance often refers to fluid exchanges (balance between inflow and outflow), recalling the income/expenses/patrimony terms of general accounting. Cardiac output (CO) and venous return (VR) are synchronized, with an identical stroke volume in both ventricles. In the calf-muscle pump (CMP), ejected volume (EV) and capillary refilling (CR) functionally match CO and VR. The accounting period is a cycle-length, like the heart-beating interval or the CMP contraction/relaxation cycle-length. At the start of the period the CMP is in the same functional status, i.e. with its rest diastolic/patrimony volume. A sequence of periods provides the history of the patrimony, while the details of each period make the economic account, the final net changes being added to the patrimony to produce the new starting amount. Managing the simple equation: Income – Outcomes = Net we get
Income = Outcomes + Net
which organizes in two columns (Credits/Debits) the CMP accounting. In healthy people, volumes are EV (outflow) and CR (inflow). In venous pathology the direct/indirect reflux in GSV/SSV (inflows) and the CMP perforating veins reflux (outflow) must be added. The aim of this research is to describe the CMP volume balance, using terms currently used in accounting and showing that a simple arithmetical relationship can be set for the CMP contraction/relaxation events. Measurements are partially achieved by plethysmography or ultrasound. The details and some practical examples will be shown in the presentation.

Hemodynamics of the Klippel-Trenaunay syndrome
Raul Mattassi

Klippel-Trenaunay Syndrome (KTS) is a complex vascular malformation involving the limbs. Incomplete and poor data about hemodynamic is reported. To study the defects existing in KTS and the hemodynamic of the malformation, a group of 46 patients, observed in a recent, short period were analyzed. All patients were studied with: Duplex scan, lymphoscintigraphy and MR with and without contrast media. Clinical signs were cutaneous nevi in 42 cases (91%), dilated superficial veins in 46 cases (100%), limb length discrepancy in 21 (46%), with limb elongation on 18 (39%) and limb shortening in 3 (7%) and no limb length difference in 25 (54%). Vascular anomalies were: aplasia of deep veins in 9 cases (19,5%), hypoplasia of deep veins in 9 cases (19,5%), deep areas of dysplastic veins in tissues, in 19 cases (41%), superficial areas of dysplastic veins in 46 cases (100%) and anomalies of lymphatic trunks (aplasia, hypoplasia or dilatation) in 13 cases (28%). Hemodynamic study demonstrate a range of defects including reflux from abnormal perforating veins in dysplastic superficial veins, and in avalvulated marginal vein, venous stasis in intramuscular dysplastic veins with partial thrombosis, abnormal outflow as bypass of occluded deep veins and stasis in aneurysms. Fluid stasis in lymphatic, dysplastic areas were shown by lymphoscintigraphy.

The importance of 3D representations in venous diseases
Jean-Francois Uhl
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The revolution of medical imaging opens the way of anatomical assessment of the venous system by 3D interactive modeling. This is mainly achieved by multislice CT-venography (direct or indirect). It provides accurate 3D information on the venous anatomy in addition to the hemodynamical data of the Color duplex imaging. This is particularly useful:
1- For investigation of varicose veins patients, especially in complex cases, anatomical variations and REVAS. It should be done in those cases before treatment as additional information to the USD mapping and skin marking. These provide useful landmarks to help the operative gesture’s achievement.
2- For congenital venous malformations, it is mandatory to assess the deep venous network and fully understand the complex anatomical topography.
3- For DVT is provides accurate 3d informations on the venous lesions in addition the USD investigation.
4- To assess deep venous obstruction, it is the best exam after IVUS.
5- For «normal» CVD patients, especially with unilateral disease, it frequently underlies deep abnormalities which may be misunderstood in the majority of the cases: they could find a cause in the so called «primitive CVD»

Short, mid and long term results of CHIVA. Available data from literature
Sarah Onida

Chronic venous disease (CVD) is a common condition that negatively impacts on patients, with effects on mobility, daily activities and quality of life. Treatment of symptomatic venous disease is known to be cost
Hemodynamics, the key to cause and (interventional) cures in multiple sclerosis
Franz Schelling
Department of Radiology, Regional Hospital, Feldkirch, Austria

Introduction: Veins have been shown to be central to the emergence of cerebral multiple sclerosis lesions. The pertinent in vivo and postmortem evidence indicates an involvement of circumscribed sectors of primarily larger tributary vessels of the internal cerebral veins. Affected and non-affected vein parts, as well as tissue compartments, were never found to differ a priori in any respect. The circumscribed changes must accordingly be determined by factors relating to, and by forces acting via the lesion veins, i.e. by hemodynamic circumstances.

Methods: The study grounds in a comprehensive review of the venous and vein-related findings made in multiple sclerosis only. In putting together these changes’ specific traits, it is sought to identify the hemodynamic factors which have here been at work.

Results: The given pieces of evidence point to an involvement of retrograde blood displacements respectively of retrograde pressure propa-
gations in the lesion veins. To events, whose biomechanical background still awaits a thorough exploration.

Conclusions: Veins appear capable of actively assailing cerebral structures, sporadically or intermittently, in various changeable ways. Elucidating the underlying biomechanisms should pave the way to interventional cures of specific instances of multiple sclerosis.

Hemodynamic changes after varicose vein surgery
Dong-ik Kim
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The objectives of varicose vein tests are anatomic localization and quantification of the reflux. Ambulatory venous pressure (AVP) has been used for the evaluation of venous hemodynamics. AVP is measured by inserting a needle into a vein on the dorsum of the foot, which is connected through a pressure transducer and the hemodynamic parameters are measured. Because of invasiveness, it cannot be repeated frequently nor be used as a screening test. Air plethysmography (APG), first introduced by Christopoulos et al., is a noninvasive technique, which can measure relative volume changes in the lower limb in response to postural alterations and muscular exercise. The results of APG have been shown to correlate well with AVP and it has been used for measuring the quantitative hemodynamic information of varicose veins. APG can be used in conjunction with duplex ultrasound to provide better information concerning venous function. Duplex ultrasound is the most useful examination for evaluating venous valvular incompetence, but it provides relatively little quantitative hemodynamic information. Several studies have shown that APG is useful to diagnose and quantify venous reflux and to evaluate the clinical severity of chronic venous insufficiency. APG provides reproducible hemodynamic measurements that can be evaluated noninvasively in serial examinations.

APG is now widely used for the preoperative examination of varicose veins, but there are only few studies that have compared the hemodynamic changes in varicose veins before and after operation. The published results of the comparative data of hemodynamic improvement between treatment modalities are limited.

Our study was conducted to assess the hemodynamic changes after varicose vein surgery by means of air plethysmography and to compare the hemodynamic changes according to the treatment modalities.
INNOVATIONS IN COMPRESSIONS

Shape memory textiles for functional compression management
Bipin Kumar
Department of Textile Technology, Indian Institute of Technology Delhi, India

In compression therapy by using textile products such as bandage, there exists huge challenge to manage the level of pressure during the course of compression. Moreover, achieving target level of pressure is also difficult during wrapping because of varying circumference and stiffness for different limbs. This work relates to the development of a smart compression system using shape memory polymeric filaments.

Smart filaments are incorporated in the structure of stocking which allows controlling the level of pressure externally at ambient conditions. Experimental results showed that the pressure can be controlled by supervising the surface temperature of stocking. Extra pressure generated by the stocking depends on the level of temperature and initial extension (P<0.05). The shape memory compression system could have immense potential for compression management as this would give more freedom to govern pressure level whenever needed during the course of compression therapy.

Compression efficacy depending on the length of the stocking
Wolfgang Konschake

Background: Below knee two-component compression stockings (AD) have revealed as effective for compression treatment of venous leg ulcers. Upto groin, thigh length stocking (AG) may enhance clinical effects, however wear comfort of these stocking may be affected.

Objectives: venous haemodynamic in relation to the length of compression stockings.

Methods: A two-component AD stocking (37 mmHg) and two thigh length stockings (AG 37, with an interface pressure of 37 mmHg; AG 45, with an interface pressure of 45 mmHg) were tested by 16 patients with CVI. Leg volume changes and venous ejection fraction and venous filling index were measured, whilst quality of life and wear comfort were surveyed by questionnaires.

Results: Volume of both the lower limb and the thigh was reduced by AG stockings, whereas AD stockings reduced only the volume of the lower limb and increased thigh volume. Venous hemodynamic, ejection fraction and filling index were improved by AG and AD stockings, AG however, was superior to AD. Quality of life and comfort of the stockings was assessed as good for AG 37mmHg, AG 45 mmHg and AD 37mmHg.

Conclusions: Thigh length two component stockings (AG) were shown to be superior to below knee stocking (AD) with regard to volume reduction and venous hemodynamic, yet wear comfort was not impaired. These results imply that healing of trophic skin changes e.g. ulcers will be faster when thigh length two component stocking will be worn.

Intelli-press wrap
Ed Arkans

This device represents the next generation in wearable compression garment therapy. Medical elastic compression stockings fail to apply sufficient pressures in standing patients, are too difficult for the patient to apply or apply too much pressure in the supine position and are uncomfortable. Non-elastic wraps can easily be applied by the patient but have inadequate pressure increases between supine and standing positions.

This new technology automatically applies physiologically appropriate pressures to the lower extremity by estimating the internal static venous pressure. This is done by determining the postural position of the patient and automatically applying programmed pressures that are low in supine, higher in sitting and quite high in standing positions.

A miniature pump and valve inflate a bladder that is incorporated into a wrap made of very short stretch material so that only short periods of pump and valve function are necessary to maintain desired pressures. Pressures are automatically adjusted as the patient changes postural positions or as the limb changes size with reduced swelling. During ambulation, applied pressures improve calf muscle pump function to efficiently expel venous blood from the limb and prevent pooling. Correct pressures are provided over both short and long term usage regardless of patient position or activity. It is easily applied by the patient and tolerability is ensured due to the controlled pressures. Patient compliance is monitored with the internal microcontroller. It is soon to enter production and distribution partners are sought to make this new patent pending technology available to patients world wide.

Evolutionary compression by water
Alfred Obermayer

Background: The cause of venous ulcers is the venous hypertension produced by hydrostatic pressure of venous blood column due to gravity (Law of Pascal). Compression therapy provides a counter pressure and is essential to venous ulcer healing and prevention of recurrence. Many options for compressing the lower leg are available including different types of bandages (long/short-stretch), inelastic paste bandeage (Unna’s boot), compression stockings, elastic wraps, adhesive elastic wraps, Velcro wraps, etc. (several Guidelines: “1A”) These treatment options are generally characterized by the same side-effects and contraindications.

The same force of compression creates different pressure values from zero to enormous pressure peaks producing skin necrosis. Hydrostatic compression: 1 m water column is equal to 74 mmHg. If an average adult is standing in water up to shoulders the area of the ankle is compressed by a 105 mmHg, exactly graduated and at the same level with exact same pressure. It is surprising that this high pressure is not percept. The pressures achieved are much higher than those that can obtained using stockings or bandages and are easily tolerated by the patient. Underwater by cam and Duplex you notice prominent varicose veins disappear, accompanied by a spontaneous orthograd flow in insufficient veins.

Using the Law of Pascal we created a „Dynamic Hydrostatic Compression System“ (DHCS) offering hydrostatic pressure created in a reservoir attached at navel height along a thin tube to a boot surround the whole lower leg for taking away the transversal pressure gradients.

A new compression pressure measuring device
Yung-Wei Chi

Background: The sine qua non of compression therapy is interface pressure yet it’s rarely measured in the routine care of patients. In 2006, the first International Compression Club consensus on “an ideal sensor” to measure interface pressure was published. After a decade from the initial call to action, manometry based devices such as PicoPress® (Microlab, Padua, Italy) and Kikuhime® (Meditrade, Soro, Denmark) are commercially available. Unfortunately, neither was widely adopted or used.
**Methods:** From a technological stand-point, the mechanical properties of manometry, piezoresistive and capacitive based sensing characteristics are vastly different with pros and cons to each. In our work, a novel patented microfluidic capacitive (intronic) sensor was developed, and was compared to the mechanical performance of PicoPress®5 according to pressure cuff based cylinder model described previously by Partsch et al.

**Results:** After 10,000 cycle runs, the iontronic sensor demonstrated stability in both mechanical response and repeatability. In sensing characterization, both the iontronic sensor and PicoPress® showed complete overlap of pressure graphs against the standard pressure cuff model, P>0.05. In other words, the 2 sensors had the same sensing performance or efficacy.

**Conclusions:** Manometry based interface pressure measuring devices are available but future device innovation should focus on accuracy, versatility, user-friendliness, wireless communication and data collection including compliance tracking to ensure seamless adoption by healthcare providers and patients.

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**Improving compliance of compression stockings by sending an sms to patients: results of a randomized controlled study**

Jean-Patrick Benigni

**Background:** Patient’s compliance is the cornerstone of compression therapy success. However, there was no objective tool to assess it.

**Methods:**
- 40 active females classified C2S were enrolled to wear compression stockings (15-20 mmHg).
- A thermal probe was inserted in the stocking (Thermotrack®), recording the skin temperature every 20 minutes for 4 weeks.
- The patients were randomized in 2 groups of 20:
  - Group 1: Receiving minimal recommendations by their physician.
  - Group 2: Receiving complete recommendations by the physician and by SMS messages (repeated once a week for 4 weeks).

**Results:**
- The analysis of the thermal curves showed a significant increase (+33%) of the average wearing time daily in the Group 2: 8 hours versus 5.6 hours (group 1) P<0.01.
- The average number of worn days per week was also increased: 3.4 (group 1) versus 4.8 (group 2). That is an improvement of the patient’s compliance from 48.5% to 70% due to the recommendations (P<0.001).

**Conclusions:** This is the first study assessing the real compliance of CVD patients for compression. It shows that better and repeated recommendations by the practitioner and by several SMS are increasing the wearing time by 33%.

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**Film compression bandage**

Johann Christof Ragg

**Background:** This report is on an ultra-thin self-adhesive polymer compression film bandage (CFB, Venaritis) for continuous wearing: 1) Use in a high-frequency clinic, 2) Comparison of 2 weeks vs. 4 weeks of wearing, and 3) ultrasound evaluation of tangential compression.

**Methods:** 1) CFB was applied on 1750 legs after foam sclerotherapy of superficial varicosities (5-18 mm Ø). 2) In a prospective study, 450 legs with superficial varicosities, 5-16 mm Ø, were randomized to 6 groups: CFB alone, CFB plus graduated compression stockings (GCS) and GCS alone, each for 2 or 4 weeks. 3) Tangential compression was evaluated for different ranges of pre-elongation and tension distribution (homogenous, focal).

**Results:**
- Continuous CFB wearing of 2-4 weeks was well tolerated in 1670/1750 cases (95.4%). Problems: Skin irritation at film margin (52/1750, 2.97%), partial premature dissolution (61/1750, 3.48%), acrylic glue intolerance (3/1750, 0.17%). 2) Symptomatic inflammations, inductions or stainings were reduced to 12.3% (14 d) versus 6.8% (28 d) with CFB alone, and 9.3% (14 d) versus 4.7% (28 d) when adding GCS, while present with GCS only in 62.5% (14 d) versus 51.3% (28 d). 3) Focally extended pre-elongation in the target area provides a more effective tangential compression than uniform tension.

**Conclusions:** 1) CBF is well tolerated for 2-4 weeks of continuous wearing. 2) 4 weeks of CFB wearing are more effective for symptom-free vein regression than 2 weeks. 3) CFB is the first modality to perform tangential vein compression, mediated by adhesion.

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**Innovative compression textile technology**

Andreas Nilsson

**Background:** Compression therapy is used in the treatment of a number of conditions that are associated with severe impact on patients’ Quality-Of-Life and health economics. Despite this, the “dosage” (correct pressure) is usually a highly illusive factor when treatment is performed with traditional compression products. The difficulties to apply compression bandages to the correct pressure is well documented. Furthermore, achieving correct pressure is an issue both with ready-to-made and custom-fitted-stockings. Even perfectly fitted stockings cannot compensate for changes in leg-volume due to edema increase/decrease. The ideal product should apply the correct pressure invariant of changes in leg-size over time.

**Aim:** To develop smart-textiles that controls the pressure invariant of leg size.

**Methods:** The properties for a smart-textile was derived from a mathematical model based on Laplace’s Law. The textile was designed to apply constant pressure when material tension varied with changes in leg curvature.

**Results:** The resulting bandage applies for the first time the specified uniform pressure independent of leg-size and shape. The same patented smart-textile was also applied in a prototype stocking resulting in the same properties as the bandage.

**Conclusions:** With the patented smart-textile, it is possible to achieve correct pressure on all patients with both bandages and smart stockings. The well-defined pressure is maintained over time, even if the leg-size changes due to edema reduction. The Future: Smart-textile technology will in a near future allow for prescription of a specific pressure and this “dosage” will be assured by the products.

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**Static pneumatic gradient compression therapy devices**

Chris Pittman

Compression is a cornerstone of treatment but there are issues that need to be addressed in order to achieve broad patient compliance and ensure effective use. Most current options are difficult to don and it is hard to ensure therapeutic levels of compression are being applied. Newer “static” pneumatic gradient compression therapy devices address these concerns including 1) Aero-Wrap and 2) ActiTouch. Static pneumatic gradient compression therapy devices address long standing shortcomings of most currently available compression.
Investigation of elastic and illusive inelastic textile materials for the comparison of compression bandages stiffness

Ferdinand Tamoue

Bandages can adequately manage pressure in the compression therapy. Long stretch bandages – elastic bandages – have a delayed rigidity when stretched and show a relative low stiffness in their application, while short stretch bandages – illusive inelastic bandages – depict an important feature for the compression therapy. This is known as Static Stiffness Index (SSI). This property is imparted to bandages during textile processing and is influenced by the material macromolecular structure as well as its resiliency. This oral presentation provides a study of the dynamic hysteresis coefficient and lengthening, allowing the examination of compression bandage systems used in phlebology and lymphology using a novel measurement parameter.

Compression bandage systems were subjected to a dynamic hysteresis test on a dynamometer, enabling estimation of the Dynamic Hysteresis Coefficient (DHC) and the lengthening (ΔL2) after 5 consecutive cycles. Evaluation of the findings indicates that the therapeutical stiffness index of the compression bandages can be reliably estimated using this new method. These findings show that illusive inelastic compression bandage systems with elastomers can achieve a sustainable compression therapy over several days. DHC and ΔL2 are proven to be highly reliable parameters for comparing different compression bandage systems.
DRUGS IN PHLEBOLOGY

Overview of veno-active drugs
Albert-Adrien Ramelet

Veno-active drugs (VAD) are an underestimated part of the conservative treatment of Chronic Venous Disorders (CVD), but also a useful adjunct to compression therapy. Main classes of VAD include alpha-benzopyrones (coumarin), gamma-benzopyrones (flavonoids, as diosmin, oxerutin, and anthocyanosides), saponins (as Horse Chestnut Seed and Ruscus extracts), plant extracts (as Gingko and Red vine leaf), animal tissue extracts (suledoxide) and synthetic products.

According to numerous randomized controlled clinical trials (RCTs), meta-analyses, and international consensus, VAD may be used as an adjunct treatment for symptomatic CUs to C6s CVD. Besides their demonstrated anti-edematous effect, VAD have a specific pain-killing effect that cannot be achieved with non steroidal anti-inflammatory agents. VAD may also be used instead of compression in specific situations such as hot climates, arteriopathies, neuropathies and intolerance to compression. According to some guidelines, flavonoids may accelerate venous ulcers' healing. This has been only poorly reported in one meta-analysis, with a limitation to a limited category of ulcerations.

VAD have been recently proposed to enhance the effect of sclerotherapy and surgery, and to lower pain induced by these therapies. These indications are still debatable and have to be validated by independent studies. However, scientific evaluation of many studies is difficult. Industrial manufactures exert a major role in clinical studies devoted to VAD. Conflicts of interest, even if major, are not mentioned in many guidelines, and debatable publications are not discarded.

According to Cochrane publications, the effect of VAD has still to be scientifically established.

VAD’s safety profile is good. However, coumarin and benzonar may induce hepatitis and some cases of agranulocytosis have been described after intake of calcium dobesilate.

VAD are not available in many countries. In others, reimbursement by social assurances has been cancelled. As an alternative, new modalities of administration like phytotherapy, food supplement, alicaments and nutraceuticals are becoming increasingly popular.

Platelet inhibitors: what is new?
Christopher Ward

Targeting platelet activation remains a mainstay of arterial thromboembolism treatment. Currently agents all increase the risk of bleeding, and recent clinical trials have focused on the rational use of drug combinations, including oral anticoagulants. Aspirin and clopidogrel remain the most common form of dual antiplatelet therapy. Individual patients show great variability in the degree of platelet inhibition on clopidogrel, a phenomenon not solely explained by CYP gene variants. Two newer P2Y12 receptor antagonists, prasugrel and ticagrelor, have predictable metabolism and platelet inhibition. Used primarily in higher risk arterial lesions or stents, their increased risk of bleeding requires caution in patients over 75 and those with prior stroke or bleeds. At present, prasugrel and ticagrelor should not be combined with warfarin or DOACs.

Vorapaxar, the first commercial PAR-1 antagonist, is the most recent antiplatelet drug to be licensed. In trials of secondary prevention (patients with prior MI, stroke or PAD), adding vorapaxar to dual therapy reduced vascular events but at the cost of more bleeding. Many patients are now candidates for combined antiplatelet and anticoagulant therapy, particularly in the setting of atrial fibrillation and coronary disease. Recent trials such as WOEST have shown that “triple” therapy (warfarin plus aspirin and clopidogrel) increases bleeding without reducing vascular events. Many alternative combinations are being trialled, including NOAC and clopidogrel. Reduced NOAC doses plus aspirin, as in the COMPASS trial, may offer a better option for secondary prevention in stable patients with coronary or peripheral arterial disease.

Role of sulodexide in management of venous thrombosis
Evi Kalodiki

Following venous thromboembolism (VTE) anticoagulants are administered in order to prevent propagation of the thrombus, decrease the duration and severity of the acute symptoms and reduce the risk of pulmonary embolism (PE) and recurrent VTE (r-VTE). Extending anticoagulation reduces the risk of r-VTE but is associated with increased bleeding. Oral sulodexide, a glycosaminoglycan, exerts antithrombotic and profibrinolytic actions with a low risk of bleeding. The aim of the Sulodexide in Secondary Prevention of Recurrent Deep Vein Thrombosis (SURVET) study (Circulation. 2015;132:1891-7) was to assess the benefit of sulodexide for preventing r-VTE. In this multicenter, double-blind study, 615 patients with first-ever unprovoked VTE and who had completed 3 to 12 months of oral anticoagulation were randomized to sulodexide 500 lipasemic units bid or placebo for 2 years, in addition to elastic stockings. The primary efficacy outcome was r-VTE. The primary safety outcome was major or clinically relevant bleeding.

There were r-VTE in 15/307 patients who received sulodexide and in 30/308 patients who received placebo (hazard ratio, 0.49; 95% confidence interval [CI], 0.27–0.92; P=0.02). The analysis in which lost to follow-up was assigned to failure yielded a risk ratio among treated versus control subjects of 0.54 (95% CI, 0.35–0.85; P=0.009). There were no major bleeding episodes, while 2 patients in each treatment group had a clinically relevant bleeding episode. The adverse events were similar in the 2 groups.

In conclusion sulodexide given after discontinuation of anticoagulation reduced the risk of r-VTE in patients with unprovoked VTE, with no apparent increase of bleeding.

An update on antifibrinolytic agents
Robert Medcalf

A long standing yet still an attractive feature of the fibrinolytic system has been its capacity to generate the potent fibrinolytic protease plasmin, from its precursor plasminogen, preferentially on the surface of fibrin clots. This targeted generation of plasmin that also minimises systemic plasmin generation, occurs due to the presence of lysine binding sites in both plasminogen and its primary activator, t-PA (tissue-type plasminogen activator), that recognise exposed lysine residues in fibrin. This localisation of plasmin(ogen) and t-PA to the fibrin surface via these lysine residues led to the development of lysine analogues (i.e. tranexamic acid; TXA) over 5 decades ago as anti-fibrinolytic agents that bind to plasminogen and t-PA to compete with fibrin and in doing so protect fibrin from plasin-mediated fibrinolysis. It is now known that localised plasmin generation not only occurs on fibrin, but also on the surface of many misfolded proteins formed following cell injury. Moreover a number of distinct cell surface receptors have been described that also bind to plasminogen and which have important consequences on cell function, notably in the brain and on the innate immune response. The interaction of plasminogen with misfolded proteins and also with many
plasminogen receptors, also relies on interaction with lysine residues and hence can also be blocked by TXA. This presentation will overview the clinical potential of anti-fibrinolytic agents like TXA to influence plasmin-dependent proteolytic events in vivo that are not necessarily related to the removal of fibrin.

Medical management of Raynaud’s syndrome
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General measures for Raynaud phenomenon include education, warming of the affected body part, and cessation of vasoconstricting agents such as nicotine. The history of patients and the specific diagnostic test are mandatory. For primary Raynaud phenomenon, the first line of therapy consists of lifestyle measures, such as avoidance of precipitating factors and use of gloves. If these prove inadequate, the patient may be considered for calcium channel blocker treatment (nifedipine). Topical nitroglycerin has been found to help.

Therapy for secondary Raynaud phenomenon must be tailored to the underlying disorder. If the disorder is associated with occupational or toxic exposure, the patient should avoid the inciting environment. Other treatments include calcium channel blockers and prostacyclin analogues, Phosphodiesterase-5 enzyme inhibitors (sildenafil, tadalafil, vardenafil), Losartan, Bosentan (endothelin receptor antagonist).

In the severe conditions with digital ulcers, a digital (or stellate ganglion) block with lidocaine hydrochloride relieves pain and produces a chemical sympathectomy that may reverse vasoconstriction. Regarding our experience in the last two years with bosentan, we evaluated two group of patients: 128 patients with limited cutaneous SSc and RP were treated for 16 weeks. The treatment resulted in a significant reduction of pain and in the daily duration, number and severity of RP attacks.

The second group with 78 patients with severe SSc with at least 1 digital ulcer were treated. Over 24 weeks, the treatment was associated with a 30% reduction in the number of DUs.
GLUE ABLATION

Treatment of incompetent perforators with glue
Kursat Bozkurt

Introduction: Perforating vein ablation (PVA) with N-Buthyl Cyanoacrylate glue is a new concept. We report herein our experience with 50 patients with 12-months follow-up.

Patients: 54 incompetent perforating veins (IPV) were treated with glue.

Technique: A conventional cannula (16 G) was placed in the IPV using ultrasound guided technique. We used a specifically designed catheter and the tip of the catheter was localized just above the fascia. The first 0.2 cc was given under USG guidance, and allowed to polymerise for an initial period of 2 minutes. The adhesive becomes echogenic with time. Afterwards with minimal withdrawal of the catheter tip, another 0.2 cc were introduced to make sure complete occlusion. 0.2 cc per 5 mm glue was given for long IPV. A mean of 0.7 ml of cyanoacrylate adhesive was used per IPV.

Only 1 thrombophlebitis was seen. No deep venous thrombosis and no neurological damage was detected. The patients treated from July 2014 to January 2015, during the learning curve period, 9 of the 16 perforating veins (56.25%) were closed at 12 months follow-up. During the January 2015 - March 2016 period 33 of the 38 treated veins were successfully blocked at 12th months (86.8%). In the total experience, 12-months closure rate were 42/54 veins (77.8%). Healing of the ulcer rate was 88.9% and healing with closed IPV was 100%.

Comment: PVA of incompetent perforating veins is feasible and as effective as endovenous thermo-ablative techniques without the risks of potential inadvertent thermal lesion.

Physiochemical properties of glue
Yunus Emre Cakiroglu

Endovenous use of n-butyl-cyanoacrylate (NBCA) or glue for venous insufficiency getting more popular and preferred everyday. In this oral presentation we will discuss physiochemical properties of glue in order to fully understand underlying characteristics of this treatment. We will specifically discuss chemical structure, polymerization mechanics and treatment characteristics. Furthermore we will discuss current treatment methods and clinical evidences.

New techniques for cyanoacrylate injection of saphenous veins and tributaries
Stefania Roberts, Ken Myers
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Commercial cyanoacrylate (CA) is now available for direct injection under ultrasound guidance for saphenous veins or for tributaries deep to the surface. We have used cyanoacrylate embolization (CE) for more than 100 venous territories over the past 9 months for primary and recurrent varicose disease using Venablock and Veinoff polymers.

The proprietary mixture for Venablock polymer contains n-butyl cyanoacrylate (NBCA) while that for Veinoff polymer contains 2-octyl cyanoacrylate (OCA). The Venablock preparation is less viscous than Veinoff while Venablock polymerisation is faster than for Veinoff, and either is selected on the basis of anticipated rate of injection. If treatment is required, these are now offered for saphenous reflux for veins <4 mm diameter, deeper tributaries of any size, neovascularisation and perforator reflux. Preparations are being developed for superficial tributaries. The VenaSeal technique is preferred for larger saphenous veins.

Preliminary results show an occlusion rate for long segments after a single session of treatment in more than 90% so that these forms of CE are now preferred to ultrasound-guided sclerotherapy (UGS) due to perceived better occlusion rates with fewer treatment sessions required. However, patient concerns include injection of a foreign substance and cost. Differences in technique compared to UGS will be described. Further development of these techniques promises to provide an alternative to UGS in many patients.

Fast progressive devastating granulomatous reaction after VenaSeal procedure
Frantisek Zernovicky
National Institute of Cardiovascular Disease, Bratislava, Slovakia

Till the end of 2017 we have performed more than 4000 different vein ablations (RFA, Laser, MOCA and Glue.) Our aim is to select the optimal procedure for every patient, as well as develop the best possible protocol for particular disease. Since April 2015 to March 2017 we have accomplish 158 VenaSeal procedures (cold ablation with N-2- butylecyanacrylate - biological glue VenaSeal). 31 patient have been indicated because of medical reason - concomitant peripheral arterial disease, lymphedema, unfit anatomy, extreme obesity etc. 54 patients preferred non thermal non tumescent ablation with VenaSeal procedure, despite thermal tumescent ablation was offered. 73 patients have treated small saphenous vein (in most of cases with longer cranial extensions).

The published data (Feasibility study, eSCOPE study and VeClose study), proclaim that the VenaSeal procedure is safe and effective, with consistent results across clinical trials. The safety profile seems to be acceptable and side effects are minor and infrequent. Despite to all these optimistic affirmations, we have constrained to counteract a dramatic fast progressing granulomatous reaction on both legs 4 months after VenaSeal ablation. 54 years old female was indicated for VenaSeal procedure of both GSV because of symptomatic reflux. Serious concomitant diseases (polycythemia vera, hepato-megaly, splenomegaly, portal hypertension, portal vein thrombosis, thrombocytopenia, esophageal bleeding) was present. We decide to perform less traumatic procedure with the glue (VenaSeal). There was not peri-operative complications. Both GSV was closed completely after operation and 3 months the patient was without any discomfort. After 4 months patient come with spontaneous skin perforation with spontaneous evacuation of pieces of glue. The microbiology was repeatedly negative. Unfortunately we observed successively growing additional granulomas along the treated GSV on both side. Despite local corticoids, and excision of first granulomatic hitch, we was not able to stop or slow down the fast progressing painful reaction along the treated part of GSV on both legs. Progressive redness, pain and swelling was present on both extremities. Through out six weeks on ultrasound picture discovered a movement of the glue in the terminal part of both GSV. As a prevention of systemic embolisation we decide immediately for bilateral safenectomy the pain and redness was reduced, unfortunately on the left leg there appears a iatrogenic lymphedema.

We would like to share our experience with these dramatic fast devastating complication after VenaSeal procedure. What are the first symptoms? What are the first ultrasound pictures? What is present on
histological studies and immune histological studies? Is the immediate safenectomy necessary? What should be done to avoid these redoubtable complications?

**Experience with cyanoacrylate catheter embolization for saphenous reflux**

Stefania Roberts, Ken Myers
*Victoria Vein Clinic, Melbourne, Australia*

Cyanoacrylate embolisation (CE) by the VenaSeal catheter technique has been used to treat more than 200 refluxing saphenous veins over a 3-year period. N-butyl cyanoacrylate (CA) is delivered at 3cm intervals along the vein from 5cm distal to the saphenous junction under ultrasound guidance. CE is offered as preferred treatment for all patients requiring intervention for saphenous reflux with vein diameter ≥4mm. Reasons to prefer to endovenous thermal ablation (ETA) include no need for tumescent anaesthesia and quicker recovery, while it is considered to have more reliable outcomes compared to ultrasound-guided sclerotherapy. Reasons for refusal were concern as to embolism, dislike of having a permanent foreign substance implanted and cost. As a result, more than 700 veins were treated by ETA in the same period. Cumulative occlusion rates were similar in the two unmatched groups with 95% occlusion for CE at 12 months. Quality of life scores were significantly improved after CE. Recurrences were all for veins greater than 6mm diameter since when a double dose of CA is delivered for larger veins or at segments of dilatation. Measurements of the upper end of occlusion shortly after treatment showed 90% were within the 5cm from the junction with just one protruding into the deep vein. Most patients had little post-operative pain or inflammation but 15% developed a significant inflammatory reaction along the vein, often just on one side after bilateral treatment.

**VenaSeal™ (cyanoacrylate) for chronic saphenous insufficiency – early results of a single center experience in Australia**

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**Background:** Cyanoacrylate is an innovative non-thermal alternative treatment for saphenous vein insufficiency. This novel technique was first described in 2011 with subsequent safety and efficacy for chronic varicose veins shown in 2014. This Australian observational single centre study is aimed to assess the experience, efficacy and safety of VenaSeal™ therapy.

**Methods:** 94 patients, mean age 57 years, 59% females with 145 limbs were treated for saphenous vein insufficiency from November 2014 to July 2017. Patients were assessed clinically by experienced vascular sonographers pre and post-procedure with a comprehensive duplex-scan. Scheduled follow-up visits were at 1 and 4 weeks, and then at 3, 6, 12 months and yearly to check for occlusion of targeted trunks. During 1 week scan patients were also checked for DVT.

**Results:** 197 trunks (GSV-143/SSV-54) were treated of a total of 134 incompetent limbs. The average therapy duration of a full-length GSV was 30 minutes. Pain was rarely reported post-procedure. Mean follow-up is 19.6 months and no recanalization has been reported. There was 1 GSV segmentally occluded, related to technique factors and 5 cases of symptomatic thigh phlebitis requiring medical treatment with satisfactory resolution.

**Conclusions:** VenaSeal™ procedure time is longer than ERFA. However, 100% of the trunks treated remain occluded during follow-up period, and it seems to be virtually pain free with no down time required.
STATE OF THE ART PLENARY

A look at the past 20 years. What mistakes we’ve made and what we’ve learned
Louis Grondin

Phlebology originated in Paris and Tübingen where Jean Sicard and Paul Linser accidentally discovered sclerotherapy in the early twentieth century. In 1947 Raymond Tournay, Jean Sicard, Jean Marmasse founded the Société Française de Phlébologie. In 1953, the Phlebological Association of Italy was created by were Glauco Bassi, Marcello Comel and colleagues; and in 1957, the Deutsche Arbeitsgemeinschaft für Phlebologie (Germany), was established in Frankfurt, and the Benelux Society of Phlebology was founded by Hendrix van der Molen representing Belgium, the Netherlands and Luxembourg. On March 24, 1959 the UIP was established to encourage exchange and collaborations amongst vein specialists... The rest is history... or is it? What exactly happened in the last quarter century?

During that period, digital cameras, smartphones, drones, private space planes, HIV drugs, genome sequencers, personal robots, space stations, electric cars, wireless internet connections, HDTVs, electronic books, MP3 players, and Mars landings... and voyager has entered its interstellar mission.

What are the new venous devices for great saphenous vein ablation
Lowell Kabnick

Tumescent anesthesia refers to the percutaneous administration of large volume anesthetic to cause the target tissue to become swollen or firm. The use of tumescent anesthesia is essential for the treatment of refluxing truncal veins using endothermal technologies. In order to obviate the use of tumescent anesthesia as an adjunct to treatment, one has to evaluate the technologies that do not employ thermal energy as the modality for treatment. These technologies include proprietary polidocanol microfoam (Varithena), mechanicoochemical ablation (MOCA), and the use of chemical adhesive (VenaSeal). In addition, there is a venous occlusion clip, Amsel Occluder. At present and for those devices that are tested, the ablative techniques appear to have the same quality of life outcomes. However, there are differences in cost, complication rates and technique. This presentation will include a description of each device, procedure, outcome and complications. In addition, I will give suggestions as to when to use them. Finally, I will ask an important question to the audience: Why use non-thermal devices.

Novel ways to target venous thrombosis
Steve Watson

CLEC-2 and GPVI activate platelets through a shared pathway that involves Src, Syk and Tec tyrosine kinases. The ligand for, CLEC-2, is up-regulated at sites of inflammation. While GPVI is widely known as a receptor for collagen, we have recently shown that it is also activated by fibrin. In this presentation I shall demonstrate that CLEC-2 drives venous thrombosis at sites of inflammation in the venous system through up-regulation of its ligand, podoplanin. The observation that GPVI is activated by fibrin suggests that it may also play a role in venous thrombosis. Importantly, neither receptor has a major role in haemostasis.

Antiphospholipid syndrome: a history over 30 years
Takao Koike

The antiphospholipid syndrome (APS) is an autoimmune disease in which arterial and/or venous thrombosis and/or pregnancy morbidity occurred in patients with persistently positive antiphospholipid antibodies (aPLs). Recent evidence has shown that the dominant antigenic targets for aPLs in APS are phospholipid-binding plasma proteins such as β2-glycoprotein I (β2GPI) and prothrombin. In 1998, I organized the 8th International Symposium on Antiphospholipid Antibodies in Sapporo, and the most important legacy of this meeting was the workshop that led to publication of the first “International Consensus Statement of Preliminary Classification Criteria for Definite Antiphospholipid Syndrome (Sapporo Criteria)”. An update of this criterion was published in 2006 based on the consensus of the 11th International Conference in Sydney in 2004 organized by Prof Kriks. Although significant progress has been made in our understanding of the pathophysiology of APS, many different and difficult questions are still unanswered.

Stiff compression: old but still effective
Hugo Partsch

Looking back in history compression therapy was performed with linen, dog skin and other inelastic materials before rubber was invented, which led to the development of modern compression stockings and of elastic bandage material. Today for many health care providers compression therapy just consists of compression stockings. Being unable to handle inelastic compression properly they believe that stiff material is old fashioned and forget that this material is hemodynamically superior when applied correctly.

The main reason for the hemodynamic superiority of inelastic material is the automatic increase of compression pressure in the upright position and during walking. Applied with an initial pressure between 50 and 60 mmHg inelastic bandages will produce pressure peaks exceeding 70 mmHg which are able to narrow lower leg veins in the upright position, blocking venous refluxes and reducing ambulatory venous hypertension. Such materials are also able to increase the ejection fraction of the calf pump in healthy sports people.

Due to the instant reduction of interstitial fluid there is an immediate pressure loss which makes such bandages well tolerable. In this phase, stiff bandages have a low resting pressure, but still a high working pressure which explains their ongoing efficacy.

The main problem of inelastic compression material is that the correct application needs training. Most bandages performed by nurses are applied only with a pressure of around 30 mmHg.

Newly developed compression systems offer a solution of this problem: Velcro-wraps can be can be self-applied and their pressure can be checked by simple aiding supplements. Velcro patches have been developed which can be applied over an elastic basis and will increase the stiffness and the ejection fraction of the calf pump without increasing the resting pressure. So-called “hybrid systems” combining intermittent pneumatic compression with sustained compression can keep a constant pressure by using motor-pumps and recently a system which automatically adjusts the pressure to the body position has been developed.

In summary, a renaissance of stiff compression has already started.

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unsolved; those are, what is the origin of aPLs? What are the target cells and receptors that are recognized by aPLs? Can we explain pregnancy morbidity by the involvement of the same cells and receptors as the thrombotic complications? Is complement activation (C5a/TNFα levels) predictor of APS? Is primary APS a subset of SLE? What are the target molecule(s) for the treatment of APS?

In this lecture, I will try, at least in part, to answer to these questions, not only to understand the pathophysiology of APS but also to find new strategy for treatment of APS.

**Challenging dogmas in compression therapy**
Giovanni Mosti

Many statements regarding compression therapy have just been formulated based on theoretical basis and not proved in an experimental setting. Along time these statements became real dogmas without any solid base supporting them. The following can be considered the main dogmatic principle of compression therapy:

1. compression pressure depends on material: strong with elastic, low with inelastic material
2. inelastic material is effective only during exercise and ineffective in immobile patients
3. pressure falls down with inelastic but not with elastic material
4. inelastic material becomes ineffective after some days due to its pressure loss
5. superficial veins are more compressed than deep veins by elastic material
6. lymphedema treatment requires strong to very strong pressure
7. a strong pressure is required for edema treatment
8. compression requires a graduated pressure profile
9. compression is contraindicated in arterial impairment

When compression outcomes have been tested by different methods (compression pressure measurement, plethysmography, magnetic resonance, computed axial tomography, water volumetry and other measuring methods), they were able to effectively "prove" that all these dogmas are false.
Spinal multiple sclerosis: latent venous issues
Franz Schelling
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Background: From their first illustration in 1866, the unmistakable instances of multiple sclerosis (MS) of the brain have been represented by evidently or implicitly vein-centred, ventricle-based lesions. Lesion relationships to periventricular veins were yet pointed out only in 1911. The celebrated MS archetypes, however, were marked by scarring wedges invading the spinal cord via primarily its sides. David Oppenheimer first described these lesions’ development via the denticulate ligaments in 1978. An attribution to excessive intraspinal volume shifts, effected by vehement venous flow reversals into varying venous compartments of the craniovertebral space surfaced in 1986.

How far spinal cord and nerve roots are suffering from downwards directed subarachnoid volume shifts due to intracranial/cervical epidural venous expansions or, instead, from upwards directed displacements on the part of abruptly distending lumbosacral/thoracic epidural veins is unknown.

Methods: No spinal MS postmortems respectively in vivo MRIs showing the cord with sufficient spatial resolution becoming accessible, the literature was reviewed for adequate pieces of evidence. Blunt lesion heads were assumed to show where the spinal cord tended to be vigorously displaced to, pointed lesion tails to point to the source of the volume shifts.

Results: Only a few fragmentary pieces of postmortem evidence gave vague hints pointing to exaggerated head-wards or sacrum-wards directed cord displacements.

Conclusions: In multiple sclerosis, the fluid and hemodynamic events underlying the injuring of the spinal cord via its ligaments are still waiting for their systematic exploration.

The collateral venous pathways of brain and spine: safely compensatory?
Franz Schelling
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Background: Principal and collateral channels of the brain and spine’s venous drainage are notorious for their variations and their behaving in unpredictable ways. How far the collateral venous channels are capable to compensate for deficiencies of the principal ones is generally evaluated simply in observing the sequelae of venous obstructions.

Methods: To determine the collateral venous channels’ potential compensatory function, the flow conductivity of the main and collateral channels of the cerebral venous drainage has been compared. This at critical and neither compressible nor expandable passages of their paths. Anatomical observations made in 210 human skulls, each with known cranial volume, complemented by data from the literature were used for clarifying this point.

Results: The different venous outlets of the human skull relate in contradictory ways. This conflicts with the widespread assumption the venous collaterals were the wider, the narrower the main venous passages are. In individual skulls, the conductivity of the cranial venous outlets as a whole was thereby found to be a tenth of the one found in others.

Conclusions: The collateral veins’ capacity to compensate hindrances to the ordinary venous outflow varies extraordinarily. The requirement to estimate their functional reserve calls for decided efforts to evaluate the subject in using the tools of computational hemodynamics.