PHLEBOLOGICAL REVIEW
PRZEGLĄD FLEBOLOGICZNY

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ABSTRACTS

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Dear Colleagues and Friends,

Welcome to the 2019 UIP Chapter Meeting in Krakow. Over the last years there has been significant progress in the understanding, diagnosing and treatment of venous diseases. This Chapter Meeting is a great opportunity to present not only established therapies but also new ideas and novel discoveries in the field of phlebology.

As always, this UIP conference is characterized by very high scientific quality of the lectures and communications. This year there has been especially high number of contributions from all over the world. You can find abstracts of many of these presentations in this special issue of the *Phlebological Review* (including all oral original paper and poster presentations). I hope that it would help you to better plan your participation in the conference.

I also encourage you to submit your future work to the *Phlebological Review*. The *Phlebological Review* – which is the official journal of the Polish Society of Phlebology – is an international, open-access journal that features peer-reviewed articles on research related to venous and lymphatic diseases. This journal also publishes papers on related topics, such as: molecular biology, biochemistry, genetics, biophysics and medical technology and imaging dealing with disorders of the veins and lymphatic vessels.

Welcome to Poland, welcome to UIP CHAPTER MEETING in KRAKOW.

Sincerely,
Marian Simka, MD PhD
Editor-in-Chief of the Phlebological Review

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25-27 AUGUST
KRAKOW, POLAND
UIP

PLENARY PRESENTATION ABSTRACTS/ORAL PRESENTATION ABSTRACTS

FOAM SCLEROTHERAPY – THE SAFETY ISSUE

Lorenzo Tessari

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1st step

Objectives: Foam sclerotherapy, which started to be diffused ten years ago, radically changed the phlebology world; furthermore, the usage of duplex guidance and of colour-duplex control of our treatments, led us to assess the pathways and diffusion of the microbubbles of sclerosant foam. As a result, a few hypotheses have been formulated on foam bubble propagation; whereas, in comparison, no studies have been performed on liquid sclerosants from this point of view. Several authors highlighted the necessity to study and assess the propagation of the gas microbubbles and/or of the drug within the bubbles in this "modern" sclerotherapy. The aim of this study is to highlight: 1) if bubbles and drugs are linked or separated in their pathway within the blood stream; 2) the possible changes of bubble propagation induced by various therapeutic procedures (such as limb elevation, immobility after the injections, etc.); 3) if labelling the sclerosant drug with labelled technetium (pertechnetate $99mTCO_4^-$) may be a correct procedure to highlight the pathway and propagation of the sclerosant drug in foam sclerotherapy.

Material and methods: The first study with echocardiography was performed on one patient: the arrival time of the bubbles and their persistence modalities and time within the atrium (after a standardised injection of sclerosant foam) were monitored and calculated in different time intervals. Four millilitres of foam (Tessari method) of polidocanol 0.5% + CO_2O_2 were injected in the left great saphenous vein and in a right posterior calf tributary; in another case 4 ml of sclerosant foam (Tessari method) of polidocanol 0.5% + air were injected in a left posterior calf tributary. Any difference in the bubble movement related to limb elevation, immobilisation-mobilisation was further assessed. The second study was performed to assess the possibility of labelling sclerosant drug/microbubbles with label technetium (pertecnetate $99mTCO_4^-$). The same patient was investigated at different times as to his pulmonary transit and his captation of the labelled marker within his captation organs (thyroid in primis, salivary gland, kidneys, stomach, etc.); the following assessments were was performed: 1) the pathway of FREE $99mTCO_4^-$; 2) the pathway of $99mTCO_4^-$ within sclerosant foam made with polidocanol 2% + air; 3) the pathway of $99mTCO_4^-$ within sclerosant foam made with polidocanol 2% + CO_2O_2; 4) the pathway of $99mTCO_4^-$ within sclerosant foam made with sodium tetradecyl sulphate 1% + CO_2O_2; 5) the pathway of $99mTCO_4^-$ within sclerosant foam made with sodium tetradecyl sulphate 1% + air.

Results: The three main outcomes of our studies: 1) By means of echocardiography it is not possible to highlight any link between drug and bubbles; 2) Elevation of the limb and post-injection limb immobility significantly influence the passage of the microbubbles in the blood stream/heart propagation; 3) The labelling of the sclerosant drug with pertechnetate $99mTCO_4^-$ is not an adequate procedure to highlight the pathway of the sclerosant drug in foam sclerotherapy; further details will be provided on this part of the studies. It is absolutely necessary, at this point, to apply a new study.

2nd step

Objectives: Following a few in vitro trials that showed sclerosant drug interaction with blood components, this experimental trial was designed to assess in vivo binding between sodium tetradecyl sulphate (STS), which is contained on sclerosant foam (SF) microbubbles, and blood proteins.

Material and methods: Two different groups of patients were submitted to ultrasound-guided foam sclerotherapy with 3% STS + CO_2O_2-based SF, which was formed via the Tessari method. In group A four patients (two great saphenous vein [GSV], one small saphenous vein [SSV], and one Alcock canal vein [ACV]) received a 5 cc injection of SF. Immediately before the injection (T0) and 1', 5', and 10' after the injection blood samples were retrieved from the left brachial vein. In group B 5 cc of SF were injected in a varicose tributary of the leg of two patients with GSV incompetence. Immediately before, 1', 3', 5', and 10' after the injection, blood samples from the homolateral common femoral vein and from left brachial vein were retrieved. Titration of free STS and of total, protein-bound STS (BSTS) were performed by means of solvent-assisted extraction and a molecular filter with a 10KdA cut-off (for protein filtration).

Results: In group A (brachial vein samples) BSTS (total STS) titration was, respectively, 0% at T0, 0.5% (GSV and SSV injection) and 8% (ACV injection) after 1', 5-7% (GSV and SSV) and 37% (ACV) after 5', 9-21% (GSV and SSV) and 38% (ACV) after 10'. Free STS titration at T0, after 1', 5', and 10' was 0% in all samples. In group B (common femoral vein samples) BSTS (total STS) concentration (μg/ml) at T0, after 1', 3', 5', and 10' was: 0, 1.62, 13, 24, 6, and 8.67 for the first patient, and 0, 1.42, 18.5, 8.33, and 5.43 for the second patient. Free STS titration was 0 (nil) in all samples for both patients.

Conclusions: This in vivo study conclusively proved that when injecting 3% STS SF in the veins of the lower limbs, blood proteins bind STS of SF microbubbles in less than 1'. More importantly no free (active) STS has been found in common femoral vein and beyond pulmonary circulation. Conversely BSTS (pharmacologically inactive) is tracked throughout the lower limb and central veins circulation.

WHAT IS NEW IN OUR UNDERSTANDING OF CEREBRAL VENOUS OUTFLOW? – A POSSIBLE LINK WITH NEURODEGENERATION

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About 10 years ago Paolo Zamboni suggested that multiple sclerosis can actually be of vascular origin. His team demonstrated significant abnormalities of extracranial veins draining the brain in multiple sclerosis patients. He also suggested that these lesions may play a primary role in initiating autoimmune reaction in the central nervous system and coined the term chronic cerebrospinal venous insufficiency (CCSVI), which depicted this new clinical entity. In addition, a pilot study performed by Zamboni's team revealed clinical improvements in multiple sclerosis patients after endovascular balloon angioplasty of pathological veins. At that time research on venous aspects of multiple sclerosis was in its infancy, and the majority of questions and uncertainties related to this topic remained unanswered. Currently, the body of evidence regarding abnormalities of the veins draining the brain has significantly grown, and we interpret the phenomenon of CCSVI differently than 10 years ago.

Firstly, it was hoped that venous angioplasty for abnormal veins, primarily the internal jugular veins, will be a much-awaited efficient treatment for multiple sclerosis. Yet, although open-label studies demonstrated clinical improvements, randomised clinical trials with sham arms did not reveal efficacy of endovascular repair of pathological veins. However, detailed analysis of these trials suggests that they were poorly designed and underpowered, and the endovascular techniques used were far from optimal. Also, it seems that only a fraction of multiple sclerosis patients may benefit from such a treatment, particularly those in the early stage of the disease and presenting with lesions that can easily be managed by venous angioplasty without stenting, such as septum localised in the proximal part of the internal jugular vein.

Secondly, currently we know that CCSVI abnormalities can also be found in patients with other neurological diseases and even in many healthy individuals. Ten years ago, the hypothetical link between CCSVI and neurological disease remained elusive. Zamboni suggested that accumulation of iron in the brain promotes neuroinflammation and neurodegeneration. Still, such a role for iron has not been confirmed. Then, some years later, the glymphatic system of the brain was discovered. The glymphatic system, utilising the aquaporin-4 water channels, enables a convective flow of interstitial fluid from the periarterial to the perivenous space. In this way, it clears the brain from waste products, including also substances that are thought to play a role in the pathogenesis of neurodegeneration, e.g. β-amyloid. Because the glymphatic system is closely related to small cerebral veins, it is possible that impaired cerebral venous drainage affects the functioning of this system. The recent discovery of a role for β-synuclein in the transition from relapsing-remitting multiple sclerosis into its progressive forms has shed new light on a possible link between CCSVI and neurodegeneration. Perhaps, accumulation of β-synuclein within cerebral parenchyma is responsible for neurodegenerative aspects of multiple sclerosis. Similarly, an

increased accumulation of β-amyloid or α-synuclein triggered by delayed venous drainage could play a role in the pathogenesis of, respectively, Alzheimer and Parkinson diseases. Also, a protective role against neurodegeneration of the lateral decubitus body position during sleep could result from more efficient cerebral venous drainage in this position.

NECK VEIN OBSTRUCTION: DIAGNOSIS AND THE ROLE OF PERSISTENT *CHLAMYDOPHILA PNEUMONIAE* INFECTION

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Objectives: The objective of this review is to describe the diagnosis of neck vein obstruction using a quantitative duplex ultrasound examination (QDUE), and to describe the possible role of chronic persistent *Chlamydophila pneumoniae* (Cpn) infection in producing the syndrome of chronic cerebrospinal venous obstruction (CCSVO).

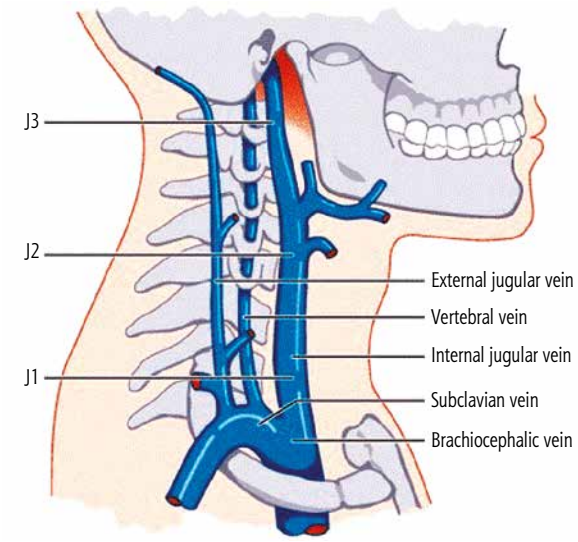

Fig. 1.

Table 1.

	High (mL/min)	Normal (mL/min)	Low (mL/min)
Right supine			
IJV J2	> 750	150-750	< 150
IJV J3	> 600	100-600	< 100
VV	> 90	20-90	< 20
Sitting			
IJV J2	> 170	30-170	< 30
IJV J3	> 150	10-150	< 10
VV	> 250	70-250	< 70
Left supine			
IJV J2	> 600	100-600	< 100
IJV J3	> 400	80-400	< 80
VV	> 70	20-70	< 20
Sitting			
IJV J2	> 170	20-170	< 20
IJV J3	> 150	10-150	< 10
VV	> 250	70-250	< 70

Material and methods: The normal patterns of flow in the neck veins is described, and guidelines for interpretation of the QDUE of the extracranial neck veins are developed. The QDUE is performed in the supine and sitting positions, and the blood volume flows in the internal jugular veins (IJVs) and vertebral veins (VVs) are recorded (Fig. 1). Measurement in the two positions is essential in order to detect obstruction in the cerebrospinal venous circulation (Table 1).

Results: An infective cause of neck vein obstruction is proposed, and from a literature search of the role of the obligate intracellular bacterium Cpn in vascular and chronic diseases, a diagnostic protocol for confirming chronic persistent Cpn infection, which includes the QDUE and specific blood tests, is suggested. The specific blood tests required are serum Cpn serology, FBC, CRP, fasting serum lipids, liver function tests, and serum Fe studies. From the results of the QDUE and blood tests, a diagnostic "algorithm" can be developed to reliably diagnose chronic Cpn obstructive vasculitis in the cerebrospinal venous system.

Conclusions: Successful treatment of chronic persistent Cpn is recognised to be difficult and entails a multimodal therapy including a prolonged antibiotic protocol, usually for at least six months, dietary measures, various supplements, and possibly life-long use of a statin drug. Therefore, certainty of diagnosis is essential. Further research to validate this diagnostic protocol is required.

EVERY VALVE TELLS A STORY. NEW HR ULTRASOUND STUDIES

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Objectives: Novel high-resolution ultrasound systems (16-32 MHz) allow new insights in venous anatomy, physiology, and pathophysiology, in particular by offering more detailed images of low-flow phenomena (B-flow mode) and small structures like vein valves.

Material and methods: We examined 1000 consecutive patients, aged 6-92 years, with several high-resolution systems (16-23 MHz: Zonare One Pro, Mindray M9; Siemens Juniper 16 MHz, Vevo MD – peak 32 MHz). Video loops were recorded for evaluation by five independent investigators.

Results: We found four major types of lesion: First, congenital valve defects like commissural mismatch, and deformed or missing cusps, which set up a primary pattern of venous disease. Such lesions could be detected in 47% of candidates of 6-8 years of age, usually comprising 1-2 valves. The lesions appeared in similar shape but enlarged in later years. From the age of 14 years, a second type of lesion became visible: valve function limitation by motion-resistant aggregates. This type of lesion, representing stasis-induced inflammatory degeneration, could be differentiated in six consecutive stages. Stages 2-6 were seen only in cases older than 24 years. Stages 1-4 included very initial limitations of cusp function until cusp fixation and the onset of reflux, while stages 5-6 were related to long periods of degenerative changes from valve degression to the total loss of valve structures, usually correlating to a history of venous disease of at least 20 years. A third component of vein disease was seen after the age of 25 years: decompensation of valves, in particular terminal GSV valves or medial perforators, by physical stress (typically heavy workers, athletes). A fourth mechanism was phlebitis, usually secondary to insufficiency and predominantly subclinical, detectable by an additional thrombotic layer, periphlebitis, or general wall thickening. During life-time, all four mechanisms interact and superimpose. Every single valve lesion contributes to the vicious haemodynamic circle of venous overload and pressure increase. Nevertheless, the basic characteristics of each mechanism are maintained and allow identification. In saphenous veins, the length of reflux correlates with the number of consecutive diseased valves, and with clinical stages.

Conclusions: There is no way of true vein diagnosis except by identification of all single valve lesions. The latest ultrasound systems provide formerly unknown insights into the origin and history of intra- and epifascial vein valve lesions, and thus in the disease, with distinct sequelae. Relevant congenital lesions and pressure-induced valve decompensation will expand until proper repair, while stasis-related valve degeneration seems be reversible and thus preventable in stages 1-4. Future strategies will intensify preventive measures for those cases proving success

and offer early and even preclinical repair for all other lesions, to save vein loss, tissue damage, and unnecessary expenses.

OBESITY AND INFLAMMATION IN PHLEBOLOGICAL AND LYMPHATIC DISEASES

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The prevalence of obesity has continued to rise considerably during the last 15 years. There is a striking increase of cases with morbid obesity (BMI over 40 kg/m^2), especially among the elderly. Since venous thromboembolic events, chronic venous insufficiency, and secondary lymphoedema also increase with age, the number of patients who suffer from these conditions and, at the same time, are obese and often multimorbid, rises disproportionately. Obesity, especially if it is visceral, causes all sorts of oedema to deteriorate, increases the risk of thromboembolic events and post-thrombotic syndrome, and can be the sole cause of the so-called obesity-associated dependency-syndrome, which is an obesity-associated functional venous insufficiency without obstruction or reflux. Whereas secondary lymphoedema was caused most commonly by operations in the past, it is now mainly and most frequently caused by morbid obesity. Of patients suffering from lipoedema, more than 50% are obese. The secondary lymphoedema is often seen in cases as a direct consequence of obesity, not the lipoedema itself. In all the conditions mentioned above, the symptoms can be ameliorated by weight loss. Besides mechanical factors like intraabdominal and intertriginous pressure, which in turn raise the intravenous pressure in the legs, it is foremost the metabolic, proinflammatory, and procoagulatory effects of the augmented visceral fat tissue that can explain the correlation between obesity and thrombosis, oedema and, probably, the skin changes, which are also typical of venous insufficiency. The latter can vary from eczema and dermatoliposclerosis to so-called hydrostatic ulcers, which form up to 60% of all venous ulcers. These effects can be identified by low levels of adiponectin, which has anti-inflammatory and vasoprotective qualities, and high levels of leptin, characteristic of leptin resistance, inflammation, and insulin resistance, and of insulin and intact proinsulin. plasminogen activator inhibitor-1 (PAI-1), and proinflammatory cytokines like interleukin (Il)-6, Il-8 and tumour necrosis factor-α (TNF-α), are also found to be raised. In addition to treating the acute or chronic symptoms by anticoagulation, compression, manual lymph drainage, and wound care, therapeutic measures must address the underlying causes and endeavour to sustainably reduce visceral fat tissue, and thus hyperinsulinaemia, insulin resistance, and inflammation.

CANCER-RELATED DVT – WHAT IS NEW IN THE PREVENTION AND TREATMENT?

Larysa Chernukha

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The treatment and prevention choice of cancer-related DVT is very important to prevent not only thrombosis and its recurrence, but also to not cause bleeding, especially in patients with active cancer. ESMO2010, ACCP2012, ASCO2015, and others recommended the use of LMWH or unfractionated heparin for primary thromboprophylaxis only in cancer patients with high-risk stratification and for those hospitalised with an acute medical illness. Primary prevention with LMWH is not recommended in patients with a high risk of bleeding (primary brain tumours). The duration post-operative thromboprophylaxis with LMWH is up to four weeks in patients undergoing major abdominal or pelvic surgery for cancer. Publications are currently awaited on the results of new trails on primary prevention using DOAC in surgical patients – NCT02366871 with apixaban and PRO-LAPSII – with rivaroxaban. Ambulatory primary thromboprophylaxis with LMWH was recommended for high-risk cancer patients (Khorana C3 score) undergoing chemotherapy. Patients with multiple myeloma receiving IMiD-based treatment or with solid tumours should receive LMWH, after which patients may be switched to aspirin. The MYELAXAT trial with apixaban in the prevention scheme seems to be effective and well tolerated in protection from VTE in myeloma patients who received thalidomide and lenalidomide, but the data have not been entered into guidelines yet. Outcomes of trials with DOAC for primary prevention in outpatients receiving chemotherapy (CASSINI with rivaroxaban, and AVERT with apixaban) indicate a decrease in VTE events but have not yet been included in the guidelines. Thrombosis that can recur has been noticed in ACCP 2016. Their cause may be cancer-unprovoked thrombosis (30% recurrence at five years) and cancer-associated thrombosis (CAT) (15% annualised risk of recurrence). In the treatment of CAT, LMWH is preferred over VKA or NOAC therapy. When recurrence of VTE happens after an index event, it requires the confirmation of VTE recurrence and an assessment of adequate anticoagulation, as well as the consideration of oncological status. If recurrence of VTE occurs on VKA or NOAC, it is recommended that treatment be switched to LMWH for at least one month. If VTE recurrence occurs on LMWH it is recommended that the LMWH dose be increased by one-fourth or one-third. The recommended duration of the anticoagulant therapy is more than three months (extended) with mandatory categorisation of the risk of bleeding. ITAC-CME, ESC2017, ESMO2017, NCCN2018, ISTH 2018, and the Canadian Expert Consensus of 2018 recommend treatment with LMWH for ≥ 6 months for patients with active cancer and VTE if it is planned to continue anticancer therapy with a periodic reassessment of the risks of bleeding and of adequate anticoagulation. According to recommendations, fondaparinux may be an acceptable alternative in patients with heparin-induced thrombocytopaenia, and UFH in the case of renal failure. For symptomatic catheter-related thrombosis anticoagulation of at least three months is recommended. The current guidelines support the use of LMWH and also suggest the use of DOAC – only edoxaban and rivaroxaban (data from the ADAM VTE trial with apixaban have not been published yet).

A NEW LOOK AT ENDOVENOUS HEAT-INDUCED THROMBOSIS RISK ASSESSMENT AFTER ENDOVENOUS THERMAL PROCEDURES

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The Centre for Dermatological Angiology, in its quest for complete healing procedures, supplemented their spectrum of endovenous venous treatment methods. Since 2014, their numbers have grown steeply, and we expect it to be 850 per year for the year 2018. Preoperative preparation does not neglect the risk assessment of possible deep vein thrombosis. Endovenous thermal radiofrequency ablation is one of the most effective methods of varicose vein treatment. Deep venous thrombosis is their repeated complication with significantly varying frequency of occurrence. According to variuos authors some signifficant risk factors were identified; for example, male, higher Caprini risk score, thrombophilic states, and obesity. The term endovenous heat-induced thrombosis (EHIT) is used to describe this situation and includes, in particular, the propagation of the thrombus from the proximal section of *v. saphena* magna to *v. femoralis*. To evaluate the risk of developing EHIT, different schemes such as the Caprini score, the Thailand study system, or the Worcestershire scheme are used. The author describes their use in the Centre of Dermatological Angiology (CDA) in Prague in the form of a retrospective analysis. For the period January 2017 – June 2018, 487 endovenous treatments with minimal EHIT type complications were performed in the CDA, due to a preoperative risk assessment, prevention, and careful post-treatment sonography controls.

COMPRESSION AFTER VENOUS PROCEDURES

Franscisco Reis Bastos[1], Jean-Patrick Benigni[2], Jean-François Uhl[2]

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Objectives: The usefulness of compression therapy in preventing side effects after treatment of superficial venous reflux is still being discussed in 2019. The choice of material and compression pressure is also an open question. Current published data detail on the effectiveness or absence of pressure effects to occlude or narrow the treated veins. Herein we discuss the effectiveness of eccentric compression.

Material and methods: Material included review studies in which compression devices are evaluated.

Results: Compression devices exerting a high pressure are always more effective than compression exerting a low pressure. In the saphenous vein at the thigh, the intravenous pressure is about 40 mm Hg. Higher pressure is needed to narrow or occlude the vein. Unfortunately, the intravenous pressure is never obtained with inelastic bandages or elastic stockings except when applying an eccentric compression. The compression applied with a simple compression stocking provides a pressure of 20 to 40 mm Hg at the ankle and about 10 to 15 mm Hg at the level of the thigh. This pressure is not sufficient to reduce the diameter of the vein and occlude the vein. In many studies, the interface pressure exerted by the compression devices is not measured. The good results obtained when low compression is applied can be explained after the application of painless procedures on small veins. Experts have recently published clinical guidelines recommended after venous procedure: 1) Compression, dosage, and duration after thermal ablation or stripping of saphenous veins; 2) Compressive treatment and duration after sclerotherapy; 3) Compression after superficial venous treatment in patients with venous leg ulcer or a mixture of arterial and venous leg ulcer.

Conclusions: Compression after venous intervention can be used to minimise pain and side effects. Two compression stockings of 18-21 mm Hg or an inelastic bandage plus an eccentric compression seem to be a good solution. However, it is important to observe the contraindications of compression, especially if the ankle brachial index is less than 0.8.

UNDERWATER INVESTIGATION OF LEG VEIN MORPHOLOGY AND FLOW

The Underwater Compression Group: D. Kontothanassis, S. Oberto, D. Bissacco, C. Lattimer, A. Caggiati

Objectives: Hydrostatic compression (HC) obtained by immersion into a pool is anedoctically considered beneficial for the venous return from the lower limbs. However, after a thorough review of the literature, no study could be found that evaluated, by Duplex ultrasound (DU) and strain gauge plethysmography (SGP), the effects of HC on vein morphology and flow.

Material and methods: Twelve legs from six volunteers and seven legs with a varicose great saphenous vein (GSV) were included in the study. The morphology and flow of the femoral vein (FV) and of the GSV were evaluated out of the pool in a standing position at mid-thigh. Blood reflux was elicited by a standardised Valsalva manoeuvre. The same measurements were repeated after immersion in a specifically built pool with one side consisting of tempered crystal glass. An SGP was modified to perform a static and dynamic measurement of the calf volume on the ground and during immersion.

Results: DU allows an excellent underwater evaluation of the vein morphology and flow. During immersion: the diameter of the FV and GSV were significantly reduced in normal limbs (p = 0.004 and p = 0.045); the calibre and the reflux in the GSV were significantly reduced (p = 0.031 and p = 0.001); a spontaneous centripetal flow appeared in the GSV and in the FV; the calf volume was significantly reduced (p = 0.002).

Conclusions: This study has clearly demonstrated the feasibility of underwater DU and SGP evaluation of vein morphology and calf volume. HC significantly reduces vein diameters, vein reflux, and calf volume, increasing spontaneous centripetal flow. Our findings are the basis for future studies on the possible application of HC in the treatment of venous patients.

TREATMENT OF REMAINDER OR RECURRENT PELVIC VARICOSE VEIN WITH ECHOESCLEROSIS WITH FOAM IN PELVIC CONGESTION SYNDROME POST-EMBOLISATION

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Objectives: The purpose of this study was to evaluate the technique of echoesclerosis with foam after post-embolisation treatment in patients with pelvic congestion syndrome (PCS).

Material and methods: Fifty-five patients who underwent therapy for PCS from 2015 to 2018 were analysed. Patients were divided into two groups: Group 1: Pelvic congestion syndrome (PCS) with or without atypical varicose veins in lower limbs; and Group 2: PCS + May-Thurner syndrome (PCS + MT) with or without atypical varicose veins in lower limbs. Both groups had pelvic varicose vein recurrence. Twenty-one were symptomatic and 34 were asymptomatic. Each group was subdivided into two subgroups according to the different technique or procedure performed. Group 1 (43 patients): Group 1A: Twenty patients were treated by using stent and coils. Group 1B: Twenty-three patients were treated by using only coils. From Group 1, only two cases (10%) recurred at six months. One case was symptomatic and the other one asymptomatic with pelvic varicose vein recurrence. From Group 1B, five cases (21%) recurred at six months. All of them were symptomatic, and only two cases had pelvic varicose vein recurrence. Group 2 (12 patients): Group 2A: Six patients were treated with stent + coils + Foam. Group 2B: Six patients were treated with coils + foam. From Group 2A, only one case recurred at six months without symptoms. From Group 2B, only two cases (33%) recurred. All of them were symptomatic and with pelvic varicose vein recurrence.

Conclusions: In our experience, the results were therapeutically favourable, but the current level of follow-up is low and too short to obtain definitive, possible, and safe conclusions. In the case of intra- and extra-pelvic varicose vein recurrences post-embolisation, the clinical review will be central to evaluate possible new embolisation or other therapeutic management, as well as the need to embolise the entire pelvic trunk to avoid recurrence. In patients with aetiology of venous insufficiency and simultaneously SCP, a therapeutic tactic should be established globally, with precise times of action, in order to optimise results and avoid recurrences.

ULTRASONOGRAPHIC VASOSPASM AS A RELIABLE PARAMETER OF SUCCESS IN ULTRASONOGRAPHIC-GUIDED FOAM SCLEROTHERAPY

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Objectives: The aim of the study was to correlate a reliable and easily reproducible ultrasound parameter that gives a favourable outcome at the time of eco-guided foam sclerotherapy of the great saphenous vein, small saphenous vein, perforator veins, and tributary veins.

Material and methods: A prospective study was carried out that included 302 patients who, after having made the consultation and the respective vascular ultrasound, were classified into four groups: 1) Great saphenous vein incompetence (GSVI) (155 patients); 2) Small saphenous vein incompetence (SSVI) (66 patients); 3) Perforator veins (29 patients); and 4) Tributary veins (52 patients). In each of them sclerotherapy was performed with echo-guided foam following the Tessari technique, taking the following variables: polidocanol concentration and volume used per leg, number of punctures per leg, and diameters of veins to be treated. An ultrasound control was performed 15 and 30 days after treatment looking for echographic venous compressibility and venous reflux presence or absence. We defined ultrasonographic vasospasm as a sudden decrease of vein diameter after administering foam in at least a quarter of its initial diameter and extending more than 10 cm from the site of application.

Results: The bivariate analysis was performed, finding a statistically significant association between positive ultrasonographic vasospasm and great saphenous vein, use of 10 ml 3% polidocanol, and vein diameter of 4 to 6 mm. We used the variables absent compressibility and absent reflux to Doppler to measure the efficacy of foam treatment because its OR = 48.

Conclusions: Ultrasonographic vasospasm is a reliable ultrasound parameter in the performance of ultrasonography-guided foam sclerotherapy of GSV and SSV, with vein diameters between 4 to 6 mm, and using volumes of 10 ml 3% polidocanol in each leg.

SCLEROTHERAPY CAN BE ENOUGH FOR VARICOSE VEINS OF PELVIC ORIGIN

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Objectives: Recent studies have shown that women have valves in hypogastric veins only in 10% of cases and gonadal veins have valves in 50% of cases; also, a free communication between these veins and their contralateral veins through the venous plexus (rectal, uterine, vaginal, bladder, and periurethral) has been highlighted; when a pelvic varicocele is evident, in most cases there is a single network, which is deep and refluxing in the pelvis, while the superficial veins (perineal and labial) in the perineal region may exhibit or not exhibit reflux, thus a prevalently pelvis located refluxing network is possible in many patients. This also happens in pregnancy, when anatomical structural and haemodynamic changes are typically visible, although the persistence of these changes after delivery may originate from pelvic congestion syndrome + lower limb varices. Pelvic congestion syndrome is a recently recognised clinical picture due to pelvic vein insufficiency. Sometimes, propagation of venous reflux into the lower extremities determines varicose veins and chronic venous disease (CVD). Moreover, Franceschi and Bahnini reported that varicose veins readily visible in the medial aspect of the thigh in the presence of a competent saphenofemoral junction, are mostly fed by reflux through the vein of Alcock channel The perineal site of reflux (point P) pierces the perineal superficial fascia at the level of the *transversus perinei superficialis* muscle. It is associated with the junction of the perineal and labial veins, which are reflux-filled by the internal pudendal vein (Alcock channel). Franceschi and Bahnini proposed a surgical approach to the treatment of these two points of reflux after a meticulous colour-duplex ultrasound investigation and precise skin marking. 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. The aim of the study was to assess the feasibility, efficacy, and safety of ultrasound-guided sclerotherapy foam sclerotherapy in treating reflux of the refluxing vein/s in the Alcock channel, as well as treating the consequent varicose veins of the lower limbs.

Material and methods: Point P has been visualised and located with colour-duplex ultrasound examination, while having the patient in a gynaecological position, with the probe in transversal position between the ischiopubic bone and the posterior vaginal cavity. When point P is located, and its distance from the skin is measured in order to establish the necessary needle length, we proceed with the direct injection of the foam prepared according the Tessari method, using sodium tetradecyl sulphate 2% and a mixture of the soluble and biocompatible gases (CO_2 70% + O_2 30%). A total of 647 consecutive female 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 three weeks. Follow-up includes clinical as well as ultrasonographic evaluation.

Results: The mean follow-up lasted 24 months. No minor or major complications were reported, and the patients' compliance was optimal. Reflux through the vein of Alcock channel as well as the connected varicose veins disappeared in the entire treated area.

Conclusions: Morphology and haemodynamics assessment through colour-duplex ultrasound investigation has become of paramount importance in everyday phlebology practice; this approach allows focused imaging and treatment, with the use of radical and cosmetically feasible procedures. Varicose vein disease can be treated with different methods, although the safest and easiest procedures could be preferred by phlebologists, and foam sclerotherapy is one of these; a conservative strategy allows us to respect vein haemodynamics as well to target the main escape points. Nine years after its appearance, the Tessari method for foam sclerotherapy has radically changed the world of varicose vein treatment, and slowly the correct parameters to assess this method are emerging: the volume of foam to be injected, the concentrations used, the types of foam (more or less viscous) to be used, as well as the proper strategy of treatment. Ultrasound guidance and the innovative usage of intravenous catheters and the use of biocompatible gas mixtures make foam sclerotherapy very practical and easy to use. Similarly, also large diameter veins can be treated with this method, thus creating a valid alternative to surgery in many cases. Our experience demonstrates that in the case of pelvic varicocele with escape points (such as the P point) 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.

EFFECTS OF COMPRESSION STOCKINGS AND POSITION ON THE RETICULAR VEINS CALIBER

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Objective: H. Partsch has shown that the pressure exerted by compression stockings is not sufficient to narrow or occlude the superficial veins in the lower limbs. The effect of stockings is mainly proved on the skin and paradoxically on the deep venous system of the calf.

The effect of compression stockings on the reticular veins immediately below the dermis has never been evaluated. The aim of the research was to study the variations of caliber of the reticular veins at the calf level according to different positions and compressions.

Material and methods: Measurements made: in 3 healthy patients of both sexes; at the point B1 on the reticular veins located with precise landmarks thanks to a grid drawn on the leg; under a low of 15-20 mmHg or two superimposed compression stockings (30 mmHg) compared to the absence of compression. The interface pressure was controled by picopress device; and with a GE probe at 20 Mhz. Comparative measurements were done in 3 different positions (lying, sitting and standing position) with 3 kind of compression (non compression, 1 stocking, 2 stockings) and repeated 3 times on each identified reticular vein.

Results: 13 reticular veins from 0.2 mm to 2.5 mm in diameter were measured in 3 positions with 3 different compressions. Each measure was repeated 3 times, thus making 354 measures. Statistical methods: means comparison by T test of student. The overall variability coefficient was found to be 16%. It was significantly higher for the measurement of tiny veins (<1.1 mm). We found that compression and positions and no influence on the reticular vein caliber (whatever the initial caliber).

Conclusions: The action of compression stockings on the RV is very light: a very small reduction of caliber, but not significant, even with 2 superimposed stockings producing 30 mmHg of interface pressure. The mechanism of action of compression on the lower limbs superficial veins is not by reduction of their caliber.

CASE-CONTROL EVALUATION OF THE IMPACT OF ELASTIC COMPRESSION BELOW 20 MM HG ON LOWER LIMB VOLUME SERIAL VARIATIONS IN STANDARDISED FLIGHTS

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Objectives: Graduated compression stocking (GCS) use during flights has been demonstrated to positively impact leg oedema. Nevertheless, these data involved different subjects in a single flight, reporting

Table 1. Volume variation in the different sectors with sock and graduated compression stockings

Volume									
Sock									
	1	2	3	4	5	6	7	8	Total volume
Pre-flight mean ±SD (mL)	141.8 ±5.3	147.8 ±8.0	164.5 ±9.9	212.1 ±14.1	300.1 ±10.5	420.4 ±11.1	449.3 ±24.8	431.3 ±25.5	2267.3 ±45.4
Post-flight mean ±SD (mL)	156.8 ±6.0	140.6 ±6.7	175.5 ±10.8	229.4 ±16.0	319.8 ±17.1	442.4 ±14.4	465.8 ±21.3	454.2 ±28.3	2384.5 ±52.7
p	0.00005	0.00001	0.00001	0.00001	0.0002	0.00008	0.00016	0.00018	0.00012
% Variation mean ±SD	10.7 ±3.2	-4.8 ±1.6	6.7 ±2.6	8.2 ±3.9	6.2 ±4.4	5.2 ±1.9	3.8 ±2.3	5.3 ±2.8	5.2 ±1.1
GCS									
	1	2	3	4	5	6	7	8	Total volume
Pre-flight mean ±SD (mL)	142.5 ±8.0	143.8 ±8.5	167.3 ±9.5	224.5 ±12.8	308.9 ±20.4	435.8 ±19.2	464.8 ±25.1	438.5 ±10.4	2326.2 ±62.4
Post-flight mean ±SD (mL)	145.8 ±7.7	147.8 ±9.0	171.3 ±9.7	228.4 ±13.3	312.7 ±20.5	429.2 ±18.6	457.1 ±26.1	430.8 ±10.3	2323.0 ±65.2
p	0.00001	0.00005	0.00004	0.017	0.00012	0.0006	0.0001	0.0003	0.396473558
% Variation mean ±SD	2.3 ±1.3	2.8 ±1.9	2.4 ±1.4	1.7 ±2.7	1.2 ±2.1	−1.5 ±2.4	−1.7 ±0.9	−1.7 ±1.5	−0.1 ±0.6

Table 2. Circumference variation in the different sectors with sock and graduated compression stockings

Circumference								
Sock								
	1	2	3	4	5	6	7	8
Pre-flight mean ±SD (cm)	21.1 ±0.4	21.5 ±0.6	22.7 ±0.7	25.8 ±0.9	30.7 ±0.5	36.3 ±0.5	37.5 ±1.0	36.7 ±1.1
Post-flight mean ±SD (cm)	22.2 ±0.4	21.0 ±0.5	23.5 ±0.7	26.8 ±0.9	31.7 ±0.8	37.3 ±0.6	38.2 ±0.9	37.8 ±1.2
p	0.00005	0.00007	0.00002	0.00003	0.00002	0.00001	0.00015	0.00001
Variation mean ±SD (%)	5.2 ±1.5	−2.5 ±0.8	3.3 ±1.3	4.0 ±1.9	3.2 ±2.1	2.6 ±0.9	1.9 ±1.5	2.6 ±1.4
GCS								
	1	2	3	4	5	6	7	8
Pre-flight mean ±SD (cm)	21.2 ±0.6	21.2 ±0.6	22.9 ±0.8	26.6 ±0.8	31.1 ±1.0	37.0 ±0.8	38.2 ±1.0	37.1 ±0.4
Post-flight mean ±SD (cm)	21.4 ±0.7	21.5 ±0.7	23.2 ±07	26.8 ±0.8	31.3 ±1.0	36.7 ±0.8	37.9 ±1.1	36.8 ±0.4
p	0.00002	0.00002	0.00004	0.0187	0.0001	0.0006	0.00001	0.0003
Variation mean ±SD (%)	1.2 ±0.6	1.6 ±0.7	1.2 ±0.7	0.9 ±1.3	0.6 ±0.5	−0.8 ±0.7	−0.8 ±0.4	−0.9 ±0.8

circumference variations mainly just at the ankle, using only > 20 mm Hg GCS. This investigation reports data from 16 flights in a one-year observation time, in which the same passenger's leg circumference variations, at every 4 cm of the leg, were assessed with the related sectors volumes, wearing alternatively non-graduated ankle-sock or below-knee 15-20 mm Hg GCS.

Material and methods: In a 38-year-old healthy male the right and left leg circumferences were measured at every 4 cm while sitting in a seat, starting from 1 cm above the ankle to the knee. The limb was divided by the circumferences in eight sectors (from 1 to 8, starting from the ankle). The assessment was done at take-off and at four hours of flight time, for a total of 16 flights. The subject used non-graduated ankle socks with the elastic band at 4 cm from B-point during the out-going flight and below-knee GCS (15-20 mm Hg) during the return flight. Volume was calculated by Kunkhe formula. Interface pressure (IP) was assessed before every flight in B and B1 positions for GCS, and in B and at the elastic band level for the sock. For four hours of in-flight time, the passenger fasted and remained seated for data homogeneity.

Results: In a sitting position, GCS IP was 13.3 ±2.5 mm Hg in B and 18.1 ±2.4 mm Hg in B1. The sock IP was 3.1 ±0.7 mm Hg in B and 8.1 ±0.9 mm Hg at the band level. Tables 1 and 2 report sector volume and circumference variations, respectively. Wearing socks led to significant volume increase (117.3 ±25.8 mL; 5.2 ±1.1%; $p = 0.00012$). Wearing GCS led to a non-significant volume decrease (–3.1 ±14.4 mL; –0.1 ±0.6%; $p = 0.3964$). The different sectors showed a heterogeneous volume variation, not following the graduated compression profile (Fig. 1B). The socks band significantly decreased the related leg circumference (Sector 2, –2.5 ±0.8%; $p = 0.00007$), increasing significantly the below sector volume (Sector 1, 10.7 ±3.2%; $p = 0.00005$) (Fig. 1A). No significant differences were reported in right and left volume variations ($p = 0.2368$ GCS; $p = 0.4310$ sock).

Conclusions: Leg oedema following a four-hour flight can be controlled by < 20 mm Hg GCS. Non-graduated ankle-socks can create

a tourniquet-like effect. Fluids, with and without GCS, are mobilised in a non-graduated profile from the ankle to the knee after prolonged sitting on a plane. The present data provide a foundation for further research on graduated compression mechanism of fluid mobilisation and on GCS clinical benefit in controlling oedema.

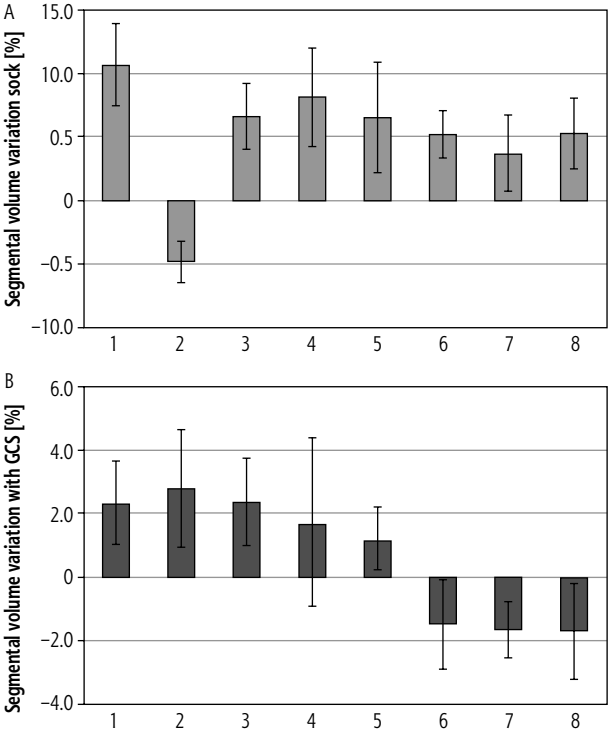

Fig. 1. Percentage volume variation in the different sectors wearing non-graduated ankle-sock (**A**) or below-knee GCS (**B**). Sectors are numbered from 1 to 8 starting from the ankle, and at every 4 cm

LOCAL TISSUE FACTOR CONCENTRATIONS IN VENOUS BLOOD INCREASE WITH MEDICAL COMPRESSION STOCKINGS

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Objectives: There is only weak evidence that medical compression stockings (MCS) prevent deep vein thrombosis (DVT). Furthermore, the body position that prevents DVT is not known. It is assumed that standing is protective and lying stationary may be provoking. Previous work using ultrasound has shown that popliteal veins at rest contain venous sludge in both positions. The aim was to investigate the effects of standing, lying, and compression on thrombogenicity. This was achieved by taking local venous blood samples and measuring an array of factors considered relevant in thrombogenesis.

Material and methods: Patients (n = 14 legs, one leg per subject) with advanced chronic venous insufficiency (CVI) awaiting endothermal ablation ($C4_{a,b}$) and healthy volunteers (n = 14 legs, one leg per subject) had local leg blood samples taken after standing (S), lying (L), and standing with compression (C), each after one hour on separate days. The MCS used was a knee-length device selected at a compression pressure of 23-32 mm Hg. Platelet poor plasma samples were tested for: PPL, TFa, D-Di, FM, F.VIIa, and VIIa-AT. This was in addition to a thrombin generation test using the PPP-reagent which measured: lag-time, ETP, peak, ttpeak, and MRI.

Results: Tissue factor (TFa) was the most responsive, with significant increases after MCS worn standing, compared to standing alone and lying, in the patients and volunteers (Fig. 1). Gravitational positioning and compression made no difference to D-dimers (D-Di) or activated VIIa-antithrombin complexes (VIIa-AT) in either group. Thrombin generation testing revealed no differences in the volunteer group, but in the patients, compression appeared to have a favourable significant effect in 4/5 measurements compared to lying (Table 1).

Conclusions: Local tissue factor concentrations were elevated significantly with MCS. This was on a background of unaffected D-dimer and VIIa-AT, thereby questioning the thrombogenic significance of the elevated tissue factor. However, compression reduced thrombin generation parameters but only in patients with CVI. Patients demonstrated also significantly reduced thrombin generation standing when compared to lying. This research supports our hypothesis that standing and compression may offer additional protection for thrombosis, but only in patients.

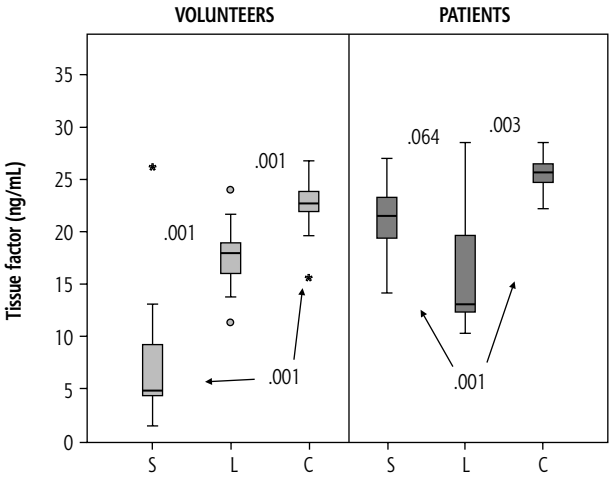

Fig. 1. Local tissue factor concentrations in response to standing (S), Lying (L), and compression (C), in volunteers and patients. Significance levels are shown (Wilcoxon)

Table 1. Median [inter-quartile range] values in 3 different laboratory situations for 1 hour

	Volunteers			Patients (C_4)		
Parameters	**Standing**	**Lying**	**Compression**	**Standing**	**Lying**	**Compression**
PPL (s)	68 [64-80]°	77 [67-93]	72 [67-81]	83 [75-91]	90 [76-97]	77 [68-82]°
TFa (ng/ml)	5 [4-10]°	17 [16-19]	23 [22-24]*°	22 [19-23]	13 [12-20]	26 [25-27]*°
F.VIIa (U/ml)	75 [55-300]	72 [54-545]	17 [11-241]°	27 [20-56]	28 [20-56]	33 [25-68]
Lagtime (min)	6.7 [5.5-8.9]	5.9 [4.7-7.2]	5.7 [4.7-6.9]	6.8 [5-9.1]	6.5 [5.1-7.4]	7.3 [5.3-8.9]
ETP (µM/min)	1.1 [0.8-1.3]	1.1 [0.7-1.7]	1 [0.8-1.5]	0.9 [0.8-1.1]	1.1 [0.7-1.4]	1 [0.4-1.1]°
Peak (nM)	150 [96-194]	2 [95-349]	136 [97-291]	150 [101-182]	175 [108-214]*	150 [63-185]°
ttPeak (min)	10.8 [9-12.3]	8.8 [7.9-11.2]	9.8 [7.6-10.8]	10.8 [8.5-13.7]	10 [7.9-11.9]*	10.9 [8.7-12.9]°
MRI	41 [22-61]	49 [24-150]	37 [24-107]	45 [21-57]	51 [31-69]*	42 [19-57]°

* $p < 0.05$ vs. standing ° $p < 0.05$ vs. lying

CLINICAL AND BIOIMPEDANCE VARIATION WITH DAILY OCCUPATIONAL ELASTIC COMPRESSION USE

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Objectives: Graduated compression stockings (GCS) have demonstrated a beneficial effect in lower limb oedema, venous symptoms, and quality of life parameter control. By contrast, evidence is lacking regarding the usefulness of GCS in healthy subjects exposed to prolonged occupational standing. The present investigation reports the preliminary clinical data of an Italian Ministry of Health investigation on the impact of GCS on lower limb swelling and symptom control in healthy subjects undergoing six-hour standing working shifts.

Material and methods: Twenty healthy scrub nurses standing up for six hours (18F/2M; mean age: 45 ±10 years; BMI: 22 ±2; CEAP C0-1a,s; VCSS 1.3 ±1.0) were enrolled after an arterial and venous ultrasound screening and detailed history report. The cohort was randomised into two groups: group A wearing no compression hosiery during a six-hour working shift (mean age 46 ±10 years; BMI 23 ±2, VCSS 1.3 ±1.1), and group B wearing 23 mm Hg below-knee stockings (mean age: 42 ±6 years; BMI 22 ±3, VCSS 1.6 ±1.1). Both groups wore no GCS (group A) and the same GCS (group B) for all the working shifts of the following months (five days per week). At the beginning and at the end of the first working shift and at the one-month follow-up working shift, the following data were collected: leg circumferences and volume according to Kuhnke formula, CIVIQ-20 and VVsymQ questionnaires, and bioimpedance parameters.

Results: A total of 18 legs were evaluated in group A and 22 legs in group B. After the first six-hour shift, the average volume significantly increased in group A (134.7 ±70.7 mL; 6.1 ±3.6%, $p < 0.0003$). No statistical difference was reported in lower-limb variation in group B ($p = 0.2210$). At the one-month follow-up six-hour shift, in group A the average volume significantly increased (168.2 ±67.9 mL; 7.1 ±2.9%, $p < 0.0007$). Conversely, in group B a significant volume reduction was detected (–59.2 ±77.0 mL; –2.5 ±3.4%, $p < 0.001$). The comparison between the limb volume variation after the first and the last shift showed no significant variation both in group A (6.1 ±3.6% vs. 7.1 ±2.9%, $p = 0.09$) and B (–1.0 ±4.0% vs. -2.5 ±3.4%, $p = 0.2605$). After the first six-hour shift, bioimpedance showed an extracellular water percentage reduction in group B (from 41.23 ±1.71% to 40.98 ±1.98%, $p < 0.04$) but not in group A. At one month, after a six-hour shift, only in group B a significant decrease of extracellular water percentage was reported (from 41.29 ±1.63% to 41.08 ±1.59%, $p < 0.01$). No statistically significant differences were recorded in CIVIQ-20 between the two groups at baseline, whereas at one-month follow-up group B showed a significantly better score (98.1 ±0.9 vs. 98.9 ±1.0; $p < 0.004$). At the end of the working shift, VVsymQ showed an overall score significantly worse in group A with respect to group B, both at baseline and at one-month follow-up (8.7 ±2.7 vs. 4.3 ±2.1, $p < 0.0005$ and 9.9 ±1.2 vs. 2.1 ±0.83, respectively).

Conclusions: GCS in healthy workers exposed to gravity is able to counteract lower limb volume increase, and promote extracellular fluid absorption, leading to a positive impact on venous symptoms and quality of life.

DEEP VEIN INSUFFICIENCY IN MAGNETIC RESONANCE IMAGING AT VARIOUS COMPRESSION LEVELS OF THE CIRCAID JUXTALITE™ SYSTEM – PROOF-OF-CONCEPT STUDY

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Deep vein insufficiency (DVI) and post-thrombotic syndrome (PTS) are the most severe forms of chronic venous disease. Although vascular interventions may offer some benefit in selected patients, the long-term outcome of such management appears unsatisfactory. Therefore, conservative treatment with gradual compression remains the easiest and most cost-effective approach. However, despite good clinical experience with compression, the knowledge regarding its action in DVI is still limited. The aim of this proof-of-concept study was to define the level of compression required to achieve a satisfactory reduction of deep veins diameter in patients with DVI/PTS. The assessment involved 20 patients with unilateral DVI/PTS confirmed by Duplex-Doppler ultrasound examination. The patients were subjected to magnetic resonance imaging (MRI) of lower legs. The deep veins in affected limbs were subjected to increasing compression of 30, 40, and 50 mm Hg using the CircAid Juxta Lite system providing adjustable external pressure, with subsequent MRI scanning. A significant reduction of deep vein diameter was achieved over 40 mm Hg. That observation correlated with a marked reduction of clinical symptoms after wearing CircAid for two weeks with compression adjusted to 40-50 mm Hg, and less pronounced symptoms relief with compression 30 mm Hg. Our preliminary results suggest that patients with DVI/PTS may benefit from use of CircAid system adjusted to 40 mm Hg because lower compression seems to be ineffective.

EVALUATION OF THREE DIFFERENT DEVICES TO REDUCE STASIS OEDEMA IN POORLY MOBILE NURSING HOME PATIENTS

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Objectives: Prolonged immobility in the sitting position in the elderly is known to produce venous stasis with leg oedema and possible skin changes. Compression stockings are often applied for this clinical problem. There are few experienced nursing staff available to supervise the difficult task of stocking application.

Material and methods: The authors researched other effective and simple devices that may be suitable alternatives. This article reports the results of three different devices to reduce leg oedema, as measured by reduction in leg volume: an electro-stimulation device, an adjustable compression Velcro® wrap, and a short stretch bandage, each tested over a two-hour period.

Results: In this randomised pilot study including 38 patients, the authors observed no difference in leg volume following electro-stimulation (Veinoplus®). They noted a significant reduction in leg volume following use of the other two devices, more with the adjustable Velcro® wrap compression (Circaid Juxtafit®) than with the short stretch bandage (Rosidal K®). Measurement of the interface pressures created by these two devices and also assessing the stiffness created by applying each device for two hours confirm that pressure is more important than stiffness in the reduction of oedema in these particular patients.

Conclusions: This pilot study is to be added to the results of previous published studies showing the efficacy in reducing leg oedema of the Velcro® adjustable compression wrap and its ease of use.

MULTILAYER COMPRESSION BANDAGING IN LOWER LIMB OEDEMAS – UTILITY OF EDUCATION OF LAY CAREGIVERS

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Objectives: To report the usefulness of multilayer short-stretch compression bandaging education of lay carers within the initial, intensive phase of physical treatment of chronic lower limb mixed aetiology oedema. The rationale for this is to enable the effectiveness of this cost-reducing management.

Material and methods: A retrospective, case-control pilot study was performed. Among adult obese patients (27 females) with venous insufficiency and chronic bilateral lower limb edema previously not treated by physical therapy, 18 (control group, CG) were bandaged once daily (four layers, short stretch with cotton tube and foam padding underneath) for

3 weeks (Monday -Friday) by skilled physiotherapists and in 18 cases (education group, EG) patients' lay carers during one session were educated by these physiotherapists according to the same regime. The following main outcome measures were evaluated: limb volume (tape circumference every 4 cm method) after 1, 3 and 6 months, time to reach the maintenance phase, frequency of complementary bandaging during this phase, and self-efficacy sense correlation with volume changes.

Results: No significant differences between two groups in the baseline measurements of age, body mass and limb volume were noted. Carers were able to apply compression bandages in all cases for the observed time. Time to reach the maintenance phase was longer in EG (6 vs. 1 weeks ($p < 0.001$). Similar median reduction in edema volume was observed at the end of the bandaging period, which maintained for 3 and 6 months. Only in EG further improvement between 1 and 3 months was observed ($p = 0.008$). All participants represented an equally high optimistic sense of personal competence (GSEs).

Conclusions: Early results demonstrate that lay carers bandaging education may provide a simple, clinically effective solution for lower limb edema management, thus lowering its costs.

EFFECTIVENESS OF INTERMITTENT PNEUMATIC COMPRESSION IN LEG EDEMA CAUSED BY LYMPHATIC OBSTRUCTION, VENOUS STASIS AND NON-HEALING WOUNDS CAN BE SHOWN ON INDOCYANINE GREEN FLUORESCENCE (ICG) IMAGES

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Objectives: The commonly used modalities for therapy of limb oedema are manual lymphatic drainage, intermittent pneumatic compression (IPC), and bandaging. Necessary for validation of compression effect is imaging of moving oedema fluid. A picture of oedema fluid flow would allow the therapist to use a force adjusted to the tissue volume and stiffness, as well as to identify sites of abundant accumulation of fluid. The aim of the study was to visualise tissue oedema fluid flow during manual drainage, intermittent pneumatic compression, and bandaging.

Material and methods: Twenty patients with post-surgical (after hysterectomy and radiotherapy in uterine cancer and mastectomy in breast cancer) lymphoedema of lower and upper limbs, 10 patients with post-thrombotic leg oedema and five cases with venous ulcers were investigated. The study was carried out in three groups: group I, manual lymphatic drainage (thumb or hand); group II, intermittent pneumatic compression (eight-chamber sleeve, each chamber inflated to 50, 80, 100, and 120 mm Hg for 50 sec); and group III, bandaging generating interface pressure of 40-50 mm Hg. ICG lymphangiography was done during each type of compression at a known force (pressure).

Results: 1) The possibility of real time observation of oedema fluid movement; 2) threshold pressures necessary to move oedema fluid to be over 80 mm Hg in the compression device and over 40 mm Hg in tissue fluid; c) inefficacy of compression in some cases despite of applying high force; d) accumulation of fluid around, but not in, the ulcer bed.

Conclusions: These observations point to the need for ICG lymphangiography before and after compression therapy in each patient.

MEDICAL-GRADE PLASTIC CONTAINERS FOR OXYGEN AND CARBON DIOXIDE (TO CREATE SCLEROSING FOAM)

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Mexico

Objectives: To study the possibility of containing a mixture of oxygen and CO_2 (30-70%) in IV solution bags and plastic syringes was analysed (all were sterile medical grade), as well as the non-flammability of such a mixture.

Material and methods: 50 bags for 1000 cc of IV solution were previously emptied of their pre-existing physiological solution; 25 needles calibre 20 to 22, as well as the same amount of three-way stopcock, all of random, new, and sterile brands, were used to contain the gas mixture within the bags, with the needle inserted in the valve and the three-way stopcock in the closed position for containing gases; 25 syringes of 10 cc, 25 new and sterile three-way stopcocks. Containment tests were made at atmospheric and forced pressure of 200 mm Hg under immersion, as well as the subsequent generation of foam with polidocanol 7 days later. The flammability of the gas mixture was also verified with flame and sparks, resulting in a non-flammable effect.

Results: Loss of volume: lossless passive immersion, lossless immersion at least 200 mm Hg pressure, lossless IV bags: no noticeable failure was detected using the bags, needles or three-way stopcocks (when not in use, it is recommended to keep the valves without needles), syringes: lossless. At the end of each week, foam with polidocanol was generated with the Tessari method, and no variation vas detected (compared with recently obtained gases). Flame and sparks test: unable to generate flame at the CO_2/O_2 outlet.

Conclusions: It is safe to transport or contain both oxygen and carbon dioxide concentrations in different plastic bags and syringes for at least seven days (preparing foam after that period). Bags tolerate a gas pressure of 200 to 300 mm Hg without showing any sign of leakage. Syringes tolerate external high pressure when they are connected to a three-way stopcock in the closed position. This study can also conclude that no explosive hazards exist with the mixture 30/70% of oxygen and carbon dioxide.

SPHERICAL BUBBLE MACROFOAM: A NOVEL METHOD FOR SCLEROTHERAPY OF SMALLER VEINS

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Objectives: Patients with dilated small tributaries and reticular veins are typically treated with liquid sclerosing agents. Whether a shift from liquid sclerosant to spherical bubble macrofoam sclerotherapy would result in efficacy and safety is unknown.

Material and methods: Patients scheduled to undergo elective sclerotherapy of small tributaries and reticular veins received injections of spherical bubbles that included a macrofoam of sodium tetradecyl sulphate 1% (ratio: 0.2 ml STS to 4 cc room air). The injection was performed with a surflo winged infusion sets 27Gx1/2 inch, tubing 8 inches. The primary end-point was total sclerosis of the targeted vessel. A key secondary endpoint was complications; other end points included safety.

Results: A total of 241 patients underwent sclerotherapy of spherical bubble macrofoam for injection of small tributaries and reticular veins. End-point data were available for 230 patients (95.4%). The median follow-up was 2.1 years. Patients received a median dose of 2.3 ml for tributaries and 0.5 ml for reticular veins. All patients received a single session of sclerotherapy. A total of 224 patients (97.4%) had a primary end-point event. A total of six patients required a second session (2.6%). Temporary hyperpigmentation was noted in four cases (1.7%). No other adverse events were noted.

Conclusions: A novel approach with spherical bubbles is a safe treatment with predictable outcomes. This approach provides novel modes of efficacy and may lead to a novel therapeutic formula for the treatment of small tributaries and reticular veins feeding clustered telangiectasias.

ULTRASOUND-GUIDED SCLEROTHERAPY WITH FOAM: NEW ADVANCES OFFERED BY 3D TECHNOLOGY

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Objectives: 3D technology enables the optimisation of the treatment of varicose veins by ultrasound-guided sclerotherapy with foam. Visualisation in B-mode has some disadvantages: In longitudinal section – the phlebologist can only see a partial and rectilinear section of the saphenous vein that needs to be treated. In cross-section – the phlebologist

can only see a superposition of venous trunks and not the anastomoses. 3D technology solves this problem by mapping the entire venous system network and providing essential information on venous curves and tributaries.

Material and methods: Using Doppler ultrasound equipment with 3D technology enables a totally non-invasive image of the venous anatomy with the same high quality as an MRI. Thanks to 3D technology, the entire venous network and anastomoses can be seen in one scan of the probe. The International School of Sclerotherapy (L'Ecole Internationale de Sclérothérapie, EIS Paris, France) provides a unique opportunity for practicing ultrasound-guided sclerotherapy in the best conditions of security and efficiency. The school provides practical, high-tech courses and training in an international, convivial, and professional setting. Training includes performing ultrasound-guided sclerotherapy with foam using Doppler ultrasound devices equipped with 3D technology.

Results: 1) Thanks to 3D technology, before the injection, the phlebologist can obtain a complete map of the leg's venous system. Using B-mode, it is necessary to carry out several scans, both in longitudinal and cross section; 2) Thanks to 3D technology, the phlebologist can benefit from a decision-making aid. 3D technology enables the phlebologist to: examine the vein that needs treatment from all sides; choose the best injection point for optimum foam distribution; evaluate the right quantity of foam for an effective filling of the varicose vein to be sclerosed; 3) Thanks to 3D technology, after the injection, the phlebologist can control the sclerosis achievement. He/she can: ensure that the incompetent saphenous vein is completely filled with foam; verify the vein spasm that ensures the success of the procedure; 4) 3D technology enhances patients' well-being. The tremendous advantages to patients of ultrasound-guided sclerotherapy with foam are already well-known: this non-invasive, out-patient procedure treats varicose veins of all sizes, including those greater than 12 mm, with no need for any anaesthetic, no bed-rest, and without the need to take time off work. Three-dimensional technology enhances the comparative advantages of the technique: Thanks to the reconstruction of the venous anatomical structure in 3D, the patients can understand the therapeutic process more easily and can follow the procedure as it is happening. In just one session, patients' varicose veins in the leg can be treated more easily, even when the diameter of the saphenous vein is more than 12 mm.

Conclusions: By allowing the reconstruction of the entire venous network, 3D technology optimises the security and efficiency of ultrasound-guided sclerotherapy with foam and improves patients' well-being.

TREATMENT OF UNAESTHETIC PERIORBITAL VEINS WITH A 1064-NM (LONG-PULSE) ND:YAG LASER

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Objectives: Unaesthetic periorbital veins are a common cosmetic problem for women. Worldwide scientific literature accumulates very scarce experience in this field, consisting of very few publications dedicated to treatment of this zone with sclerosants. However, resulting post-injection haematomas lasting two weeks and the necessity of many treatment sessions do not allow us to consider this problem solved.

Material and methods: We successfully treated this kind of veins with an Nd:YAG laser, wavelength 1064 nm. 105 patients (103 females and two males), average age 36.4 ±7.4 years (23-57), were treated between December 2016 and December 2018. Periorbital veins were the problem under both eyes in 42.9% of cases (n = 45). In eight cases (7.6%) not only veins under the eyes were the problem, but also veins above the upper eyelid. We did not use local anaesthetic, predicting possible vein spasm. All procedures were performed with local cooling (cryocooling, –30°C), Nd:YAG Almalasers Harmony XL Pro 1064-nm LP, spot 6 mm. After skin cooling for 1-2 seconds we delivered an impulse, pulse duration 15 ms, fluence 120-130 J/cm^2, per every 6 mm along the vein. After vein spasm and its visual disappearance, we applied corticosteroid cream and recommended the prolongation of applications twice a day for 5-7 days. A control examination was recommended four weeks later.

Results: In 89.5% of cases (n = 94) initial veins disappeared. In 11 cases (10.5%) a few zones along the vein were repeatedly treated with full vein resorption some time later. We registered side effects such as treatment zone oedema for 2-10 days in 51.4% (n = 54) of the cases, which regressed spontaneously. No skin damage, burns, paraesthesia, or hyperpigmentation were registered.

Conclusions: An Nd:YAG laser with wavelength 1064 nm is a very effective and safe tool for the treatment of periorbital veins.

FOAM SCLEROTHERAPY IN THE TREATMENT OF PATIENTS WITH VENOUS MALFORMATION

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Objectives: The main task in the treatment of patients with venous malformation (VM) is the compression of dysplastic veins and cavities in cases of cavernous angiomatosis. In the case when the lesion has a medium or small volume and residual cavities after surgery, sclerosants can be used according to the foam-form technique.

Material and methods: We analysed the results of treatment of 117 patients with VM, depending on the location: the head and neck 13 (11.1%), upper 11 (9.4%) and lower 72 (61.5%) limbs, corpus 7 (5.9%), pelvis and external genital organs 4 (3.4%), and mixed localisation 10 (8.5%). Fifteen patients underwent surgical treatment, which was supplemented with sclerotherapy. 96% ethanol was used in the obliteration of lesions in the event of failure to provide adequate compression (face, neck). Sclerotherapy in the case of VM of the extremities and corpus was performed according to the method of Cabrera G (with a 3% solution of aethoxysklerol). Compression therapy was carried out in all cases with adhesive bandages with low strength. In patients with an existing clinical picture of chronic venous insufficiency of the lower extremities, chronic venous disease severity analysis was performed before and after such interventions in accordance with the CEAP classification.

Results: The immediate success of the procedure was 90.5%. The possibility of a significant reduction in the amount of the drug used by creating a foam-form has made it possible to increase not only the therapeutic effect of sclerotherapy, but also its safety. The combination of surgical techniques with minimally invasive interventions (primarily with sclero-obliteration) made it possible to ensure greater effectiveness of the treatment as a whole.

Conclusions: Despite the clear superiority of surgical aids in the removal of angiomatous tissues in VM, the use of sclerotherapy allows us, in some cases, to achieve reliable obliteration of residual cavities. Accurate adherence to the indications and regulations of sclerotherapy ensures the safety of treatment sessions. When conducting sclerotherapy in places where it is impossible to provide compression, it is necessary to use 96% ethanol. When hardening the superficial pathological vessels and cavities, the use of the foam-form of sclerosants is reliable and safe.

COMPARISON OF ENDOVENOUS STEAM ABLATION VERSUS HYBRID ABLATION (ENDOVENOUS STEAM ABLATION + ULTRASOUND-GUIDED FOAM SCLEROTHERAPY) FOR GREAT SAPHENOUS VARICOSE VEINS

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Objectives: The aim was to compare endovenous steam ablation (EVSA) and hybrid ablation (EVSA + ultrasound-guided foam sclerotherapy [USGFS]) for great saphenous varicose veins in a non-inferiority study.

Material and methods: We retrospectively reviewed the data of 108 patients with varices, who underwent EVSA or were qualified for EVSA, and 63 patients who underwent EVSA + USGFS (total: 171). All the patients were with primary great saphenous vein reflux. Primary outcomes were treatment success (vein obliteration) at six months and efficacy of the procedures. Secondary outcomes were satisfaction with

treatment, pain and duration of analgesia, use and days lost from daily activities, necessity of repeated interventions and complications, and the presence of residual veins and skin discoloration at six weeks, and three and six months.

Results: A total of 171 legs (CEAP III, VCSS = 4-8) were treated (EVSA, 108; EVSA + USGFS, 63). At six months, the treatment success rate after EVSA + USGFS was not inferior to that of EVSA: 92 (95% confidence interval [CI] 86 to 98) vs. 96 (92 to 100)%, respectively. Changes in VCSS after six weeks, and three and six months were similar: −2.71 (95% CI −2.36 to −3.02) and − 2.49 (−2.9 to −2.92). CEAP score decreased equally six months after both treatments (from III to I). Patients treated with EVSA + USGFS reported less postprocedural pain, fewer days of analgesia use, were more satisfied with therapy, and had a shorter convalescence. Complication rates were significantly smaller after EVSA + USGFS. The average consumption of foam made with 2% Aethoxysklerol ranged from 6 to 8 ml (foam was made according to the Tessari method).

Conclusions: The six-month success of EDSA + USGS treatment was better than that of EVRA. A few secondary results were EVA + USGS (varicose veins were closed, no residual varices were observed, discolorations were minor and small, there was no need for additional procedures).

ENDOVENOUS LASER ABLATION IN ASCENDING VARICOSE THROMBOPHLEBITIS

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Objectives: Currently, the EVLA method is widely used to treat varicose lower extremity veins. The use of "water" lasers with wavelength of 1470-1560 nm and radial fibres has led to a large percentage of obliterations (96-97%) and a small number of recurrences (2-4%). At the moment, discussions are being held about the use of the EVLA method in ascending varicose thrombophlebitis.

Material and methods: The results of the treatment of 250 patients with ascending varicose vein superficial thrombosis, including 108 (43%) patients treated invasively, were analysed. The EVLA of main stems of saphenous veins was performed in patients with a background of varicose thrombophlebitis. The operation was performed with Biolitec devices (Leonardo 45 dual, Ceralas E 45). The operation was performed using Biolitec radial fibres (Elves Radial 2ring, Elves Radial 2ring slim). Fibre extraction was performed using a Pulback device (Biolitec) with the ability to change the rate (0.5; 1; 1.5 mm/s). Tumescent anaesthesia was by means of a Noavag DP 30 pump. Energy control on the optical fibre lens utilised an Ophir StarLine (sensor diameter 65 mm). The first group composed of 142 patients received only standard conservative treatment of varicose thrombophlebitis. The second group, comprising 108 patients, underwent the EVLA of main stems of saphenous veins on the background of varicose thrombophlebitis, including the EVLA of VSM stem in 83 cases and EVLA of the VSP stem in 25 cases.

Results: When conducting the analysis of treatment results in the first group, 26 cases of the thrombosis level progression and the danger of transition to deep vein thrombosis was observed. The duration of rehabilitation period (time of inflammatory response reduction) in the first group averaged 6-8 days. It should be noted that the absolute number of observed patients of the first. It should be noted that all patients from the first group underwent EVLA. No signs of varicose thrombophlebitis progression were observed, and no complications, such as deep vein thrombosis, were found when conducting the analysis of treatment results in the second group. The average rehabilitation period averaged 2-3 days. No recurrence of varicose veins for up to two years was revealed.

Conclusions: In our opinion, the use of active tactics (EVLA performance) on the background of ascending varicose thrombophlebitis enables a reduction of the risk of thrombophlebitis progression and a significant reduction of the duration of rehabilitation period. In addition, despite the availability of varicose thrombophlebitis, the EVLA performance enables us to solve cardinally the problem of varicose veins.

RANDOMISED STUDY ON THE INFLUENCE OF FIBRE TIP DISTANCE FROM THE FEMORAL VEIN IN GSV LASER SURGERY

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Objectives: Changing the fibre tip distance from 2 to 1 cm from the femoral vein in GSV laser surgery has a significant impact (the early recurrence rate decreased from 13.8 to 1.2% in our survey). Is it significant that the distance is shorter?

Material and methods: Between 1 January 2012 and 31 December 2014 a total of 354 GSV varicosities were randomised: the laser fibre tip was 0.5 cm from the femoral vein (group 1: 184 limbs) and 1.0 cm (group 2: 126 limbs). The diameters of the GSV at the junction were between 4 and 31 mm (group 1 mean: 7.2 and group 2 mean: 7.4 mm). Diameters were above 10 mm in group 1 (31 cases) and in group 2 (23 cases). To the subjunction 3 cm 200 J/cm energy was delivered in both groups. Check-ups were performed from 1.5 to 53 months (mean 10.2 months) after surgery.

Results: Tributaries were occluded in 78.9 (group 1) and 66.5% (group 2) a significant difference ($p < 0.05$). In open tributary cases, epigastric and circumflex veins remained patent. The occlusion of the SFJ was flush with the femoral vein in 66.5 and 69.4% (not a significant difference). During the follow-up, recurrencies were found in the two groups: 6 (3.2%, group 1) and 11 (8.7%, group 2). In 2 cases accessory anterior varicosity (0.5%) (1 and 1) and in 2 cases recanalisation of the GSV (2 in 1.0 cm group) (0.5%) was the reason. Further causes of recurrency were: SSV, perforator vein and remaining varicosities (3, 9, 5 cases respectively). There were no thromboembolic events.

Conclusions: If the tip of the laser fibre is 0.5 cm from the femoral vein in GSV varicosity laser surgery, recurrency results are better than in 1.0 cm cases, but the difference is not significant. A small but significant improvement was found only regarding tributary occlusion rates. This means that the change in results if the fibre tip is 0.5 cm from the femoral vein is not as great in this study as was found formerly when the distance was changed from 2.0 to 1.0 cm. The possible reason for the small improvement is that both in 0.5 and 1.0 cm cases most anatomical sites of SFJ tributary openings were occluded. This short-term study did not show any drawbacks of SFJ tributary occlusion as was feared formerly.

OPEN VEIN CONCEPT IN ACUTE DVT TREATMENT – STILL A VALID APPROACH OR ALREADY IN THE PAST?

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It is more and more evident that CDT or other endovenous early thrombus removal methods have to follow strict rules in terms of obtaining as much free lumen as possible. This is based on old knowledge showing that residual thrombus is predictive of DVT recurrence and thereby of further risk for PTS in patients treated with anticoagulation alone. This important observation can forcibly be transferred to any principle of thrombus removal: to implement a procedure in the most optimal manner, not only to open the veins, but also to clean the veins and preserve the valves. In another abstract for this meeting, some technical recommendations are mentioned. In this context, to answer and argue for the "still valid approach" mentioned in the title, existing literature are available going back to the US multicentre study in 1999 supplemented with more recent publications. Thus, we have five important papers including a total of 640 patients treated with different types of CDT for acute iliofemoral DVT looking back to analyse factors, which might influence the outcome in a negative direction. Incomplete lysis, residual thrombus and stenosis, lack of patency, and reflux at six months proved to be predictive for loss of patency in the long-run, including stent patency, and predictive for DVT recurrence and PTS. Some trials have different thresholds for satisfactory thrombus removal, some papers do not mention a threshold at all, whereas some have 90% removal as a success criterion. Furthermore, many trials only use a stent if persistent stenosis causes 50% or greater narrowing of the

vein diameter. This seems illogical, even if we do not know exactly what a haemodynamic stenosis means, like we do in the arteries. However, any residual obstruction, either residual thrombus or stenosis from a compression syndrome, is a thrombogenic focus in DVT. The length of symptom duration, and thereby thrombus age, plays a role in the success, which is why compliance to the recommendation of a maximum of 14 days is crucial based on experimental and clinical work. Having a limit for the total dose of a lytic drug might also remove the focus from achieving full and satisfactory thrombus removal. The maximum lytic infusion per day, and even in total, have never shown benefit in reducing major bleeding rates compared to a free length of treatment. Finally, it has to be emphasised that ballooning alone for persistent obstruction is an insufficient treatment due to relapse of the vein wall. Stenting is essential and is needed in at least 50% of cases. Selection of patients and surveillance after treatment is important for patients treated with thrombolysis for acute iliofemoral DVT, whatever the method chosen. Conclusively, it is extremely important to optimise the treatment using a sufficient amount of rt-PA, heparin, infusion volume, IPC, and stenting with a goal to restore 85-90% of lumen. This might result in optimal results with patent veins with normal valve function and achieve a low rate of PTS. I suggest that the term "clean veins" is preferable instead of "open veins". In that case, thrombus removal still is valid.

CATHETER-DIRECTED THROMBOLYSIS – TIPS AND TRICKS, HOW TO ACHIEVE OPTIMAL RESULTS

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The scope of this procedure is the installation of lytic fluid directly into the thrombus material for acute iliofemoral DVT, thereby maximising the resolution process and minimising the risk of bleeding, which was a major concern with previous systemic deliverance. Recombinant tissue plasminogen activator (rt-PA) is the most frequently used drug and is practically neutralised in the first liver-pass. This has resulted in reduced rates of 2-3% with major bleedings defined as intracranial or other life-threatening haemorrhage, need for blood transfusion, or any evacuative intervention. It has been shown recently that major bleeding carries the same risk with anticoagulation alone. The method is rational by acting with manoeuvre-skilled wires and catheters to change for optimal positions and to allow stent insertion for persistent iliac obstruction. The procedure has to be with pulse spray technique, which is shown to be more effective than continuous infusion. Usually a bolus of 3-5 mg rt-PA and 3-5000 IU of heparin is given on the table just prior to the procedure. Hereafter, it is most advisable to use 1 mg rt-PA with weight-adjusted heparin in 100 ml NaCl infusion per hour. If heparin is not added, re-occlusion occurs immediately. The process is controlled with multiplane venograms and is preferable with IVUS in the decision for iliac stenting. The threshold for cessation of lysis and for stenting varies, but any remaining obstruction > 10-15% either by compression or residual non-resolvable thrombus needs to be stented from normal to normal vein site. A stent has to cover < 50% of the contralateral common iliac vein at the confluence to avoid DVT. D-dimer can guide the resolution demonstrating an increase in initial phase followed by reaching more or less normal values as a criterion for success at the end of treatment. Intermittent pneumatic compression (IPC) on the foot and crural level stimulating the venous return is recommended from the start of the procedure. Ambulation is obtained two hours after end of CDT, otherwise IPC is still implemented. LMWH in a therapeutic dose is recommendable for 14 days followed by other AC treatment for at least three months.

Using these basic principles one can achieve treatments with duration of 2½ days on average, with discharge of the patient after duplex ultrasound examination with instructions for self-administration of LMWH and use of a below-knee stocking cl. 2. A fixed surveillance programme is planned, and the patients are instructed say if any clinical change occurs. Conclusively, optimal treatment with CDT should include the tips listed above in iliofemoral DVT with a maximum of 14 days of symptom duration. No total maximum of rt-PA is needed, because shorter treatment time has not been shown to result in lower bleeding rates. There is no need for ICU, but different countries might need this that for legal and insurance reasons. Long-term patency and normal valves can be achieved in 80% with a need for very few secondary procedures. PTS judged with Villalta score > 4 develops in 20% of cases or less.

AUGMENTED REALITY IN PHLEBOLOGICAL PRACTICE: IS IT ESSENTIAL?

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In 2008, Miyake *et al.* published an article titled "Vein imaging: a new method of near infrared imaging, where a processed image is projected onto the skin for the enhancement of vein treatment", describing augmented reality (AR) use. Since then, many improvements have been made, and the tool has been incorporated as part of many phlebologists' daily routine. The AR device emits a near infrared light, which is absorbed by the blood and reflected by the adjacent tissues. The information is captured, processed, and then projected onto the skin surface, in real time. With that, we can identify veins that are invisible to the naked eye and too shallow for ultrasound detection. In other words, it can identify the hidden feeder veins, and we can treat them, thus improving the final results of our treatments. The main advantages when we compare AR devices to other tools are: possibility of having both our hands free during sclerotherapy; larger visual field for treatment; no skin touching; real-time imaging. This is especially useful when performing CLaCS (cryo laser – cryo sclerotherapy), because it allows us to observe the vessel's immediate response, its spasm, and the effectiveness – or not – of our laser settings. Also, it helps us to find the best spot for puncture after lasing. Some points are important to note, to make the use of AR easier: use a stand – one of the main advantages of AR is the possibility of having both hands free; when marking your patients' legs prior to surgery, do it with your patient lying down, especially when marking those veins that are seen only with the AR. This way you avoid vein movement when the patient changes positions – which can put your mark in the wrong place. The sharper the vein image, the shallower it is. Keep that in mind when puncturing for sclerosants injection. Be aware of the parallax effect: what we see is a projection of the vein, and it can be slightly shifted from the vein real position, so when using it for punction, focus on the needle image instead of the "real" needle. All that said, AR can facilitate and optimise our treatments, saving us precious time and avoiding failures that could result from not treating hidden veins. But whether it is essential or not is more of a personal choice, depending on the prefference and pathology treated in the own phlebogical practice.

LASER SURGERY OF SFJ IN RECURRENT VARICOSITY

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Objectives: Repeated surgical groin dissection in recurrent varicosity is a demanding task for the patient and the surgeon. With introduction of laser crossectomy this is a simpler task, but it requires good instruments and a precise intervention.

Material and methods: In 182 cases laser crossectomy was performed when a formerly incomplete surgical crossectomy was carried out. The patients were operated on with this method, who had a 10 mm or longer saphenous stump or in whom the tributary was 4 mm or wider. Method: The same laser crossectomy method was used as in non-recurrent primary GSV varicosity cases. The tip of the laser fibre was introduced into the lumen of the GSV, and the tip was positioned 5 mm from the femoral vein. The opening of the saphenous vein into the femoral vein was compressed with tumescent solution (10 ml/cm). Higher laser energy (250 J/cm) was delivered than to the peripheral part of the saphenous stem. Anaesthesia was the same as in primary cases (tumescent solution and intravenous sedation). After three hours of observation, every patient was discharged. The results of

112 patients (61%) were checked between one and six years (mean 2.8 years) after laser surgery. In 97 cases (86.6%) there was no recurrence. This means that the rest and recurrence rate was 13.4% in this period, while in non-recurrent cases this result was 6.9%. There were no

thromboembolic complications. In the postoperative period painkillers were used only in 24% of cases.

Conclusions: The method of laser re-crossectomy is more difficult than in primary cases, but not as demanding as surgical re-crossectomy. Recurrence following laser re-crossectomy is twice as high as in primary laser crossectomy.

RESULTS OF A RANDOMISED, CONTROLLED CLINICAL TRIAL OF ENERGY SETTINGS IN ENDOVENOUS LASER ABLATION

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Objectives: In a previous study of our group we demonstrated that, in endovenous laser ablation (EVLA) for chronic venous disease treatment, the same linear endovenous energy density (LEED) with a different power setting is associated with significantly different effects on vein wall damage and tissue depth penetration. The aim of this investigation is to compare the same three energy settings regarding their clinical effects in terms of vessel recanalisation and procedural pain.

Material and methods: 154 chronic venous disease legs (C2EpAsPr) were randomised for EVLA at 5 W (50 patients), 7 W (57 patients), and 10 W (47 patients). All the procedures were performed at 70 J/cm. Pain was evaluated by visual analogue scale (VAS) at one day, one week, and two months after EVLA. Recanalisation was assessed at six months.

Results: Pain at day 1 was rated as 0 (1 quartile 0; 3 quartile 1) in the 5 W group, 0 (1 quartile 0; 3 quartile 1) in the 7 W group, and 0.5 (1 quartile 0; 3 quartile 2) ($p = 0.355$) in the 10 W group. Administration of painkillers showed no difference in the three groups ($\chi^2 = 0.236$; $p = 0.889$). No difference was reported in pain at one week and two months (one week, $p = 0.317$; two months, $p = 0.569$). No GSV recanalisation was reported at six months in all patients.

Conclusions: EVLA at different power settings with the same LEED does not present significant differences in terms of pain and recanalisation, despite the previously demonstrated difference in vein wall damage.

LASER CROSSECTOMY VERSUS ANTERIOR ACCESSORY VEIN LASER ABLATION IN THE TREATMENT OF ANTERIOR ACCESSORY VEIN REFLUX

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Objectives: Incompetence at the sapheno-femoral junction (SF) is the most common cause (70%) of varicose veins in some patients; reflux may occur in the anterior accessory vein (AAV) rather than the GSV. Endovenous laser ablation (EVLA) employs laser energy to ablate incompetent axial veins selectively and was originally described for the treatment of GSV reflux and its related varicosities. the aim of the study was a comparison of laser crossectomy vs. AAV ablation with radial laser fibres in the management of refluxing anterior accessory vein.

Material and methods: Forty patients admitted to Amria and Alexandria military hospital were divided into two groups, from February 1, 2016 to January 30, 2017. Group A were treated by ablation of the great saphenous vein at the saphenofemoral junction. Group B were treated by direct ablation of AAV. Ablation was done using radial 1480 YAG laser fibres and a large amount of tumescent anaesthesia. Post-operative duplex was done one-day, three-month, and one-year results. In group A all patients showed absent reflux post-operatively and in all follow-up visits. In group B laser fibres could not reach the sapheno femoral junction due to high tortuous AAV. In three patients (15%) the remaining segment (17.04 cm) was removed surgically. Post-operative duplex showed an absence of reflux in both groups after one day and three months, while recurrent reflexes were observed in one case (5%) in group A and two cases (10%) in group B after one year. One patient developed femoral vein thrombosis in crossectomy patients (5%), and one patient (5%) developed superficial thrombophlebitis in both groups.

Conclusions: Laser crossectomy ablation could be a safe procedure in treating refluxing anterior accessory vein when using the proper laser type and adequate tumescent anaesthesia.

ENDOVENOUS ELECTRIC WELDING IN THE TREATMENT OF CHRONIC VEIN DISEASES

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Objectives: To determine the opportunity to use and study the results of endovenous electric welding (EVEW) in the treatment of patients with chronic vein diseases (CVD).

Material and methods: A device for EVEW, which consists of a generator for the welding of tissues – EK 300M – and an endovenous instrument (Svarmed, Ukraine), provides for the creation of vein occlusion by denaturation of venous wall under the influence of high-frequency modulated electric current. The parameters of welding the cycle in each of part of the vein are generated automatically depending on the resistance of the components of the venous wall. Unlike other thermal ablation methods, EVEW is accompanied by heating to 55-75°C. The impact of EVEW has been studied in bench studies on 20 remote segments of the great saphenous vein (GSV) and the adjacent subcutaneous fat by means of a pathomorphological study. The diameter of the GSV ranged from 4.5 to 20 mm (average diameter 12.25 mm). EVEW was performed in 12 patients with CVD C3-C5 (CEAP): five men and seven women aged from 30 to 65 years (mean age 47.5 years), with diameters of GSV, including the junction segment, from 18.8 to 22 mm (average diameter 20.4). EVEW was performed in accordance with the traditional method of thermal ablation with the use of tumescent anaesthesia. The results were evaluated in accordance with the data of US at two, seven, and 14 days and after one, three, six, and 12 months after surgery.

Results: The duration of the welding cycle in different parts of the veins during bench studies ranged from 5 to 12 seconds. The heating of the venous wall was 55-75°C. During the welding cycle, a narrowing of the vein lumen against the background of spasm and thickening of the venous wall without signs of damage to surrounding tissues and carbonisation of the instrument were noted. The pathomorphological data showed alteration of the inner and middle layers of the venous wall (desquamation of the endothelium, destruction of the basement membrane, and destruction of collagen fibres) without damage of the surrounding tissues. The duration of the welding cycle in various parts of the GSV during operations ranged from 6 to 14 seconds (in the junction segment up to 14 seconds). In the postoperative period, pain in the area of the EVEW was not observed. In accordance with the data of the US, at two, seven, and 14 days and one month after the operation, characteristic signs of occlusion of the "target" GSV segments were noted with preservation of blood flow along *v. epigastrica*. After three months, in 10 (83.3%) patients, according to the data of the US, fibrous changes of the GSV were noted. After 12 months, a picture of endovenous thermal crossectomy, "electric welding crossectomy", was observed.

Conclusions: The results of the EVEW are encouraging; however, further research and accumulation of clinical experience are needed.

A RANDOMISED CLINICAL STUDY OF RADIOFREQUENCY ABLATION VERSUS 1470-NM LASER FOR GREAT SAPHENOUS VEIN REFLUX

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Objectives: Most studies have compared radiofrequency ablation (RFA) with previous generation laser technology. Our aim was to compare the outcome of RFA and endovenous laser ablation (EVLA) with the new generation 1470-nm laser for the treatment of great saphenous vein (GSV) reflux.

Material and methods: Consecutive patients with GSV reflux were randomised to RFA (VNUS® ClosureFAST ™) or EVLA with 1470-nm (radial – ELVes® or linear – VenaCure®) fibre at a single academic centre. Clinical classification (CEAP), 10-cm Visual Analog Scale (VAS) for pain, Venous Clinical Severity Score (VCSS) and Chronic Venous Insufficiency Quality-of-Life Questionnaire (CIVIQ) were recorded. Assessment visits were performed at seven and 30 days and one year post-ablation, including clinical examination and duplex scan. Primary outcome was anatomic success defined as absence of reflux or recanalisation of GSV. Secondary outcomes were procedure-related complications (thrombotic complications, ecchymosis, tenderness), postoperative pain using the VAS scale, and improvement of VCSS and CIVIQ scores.

Results: 135 patients were included in the study: 45 patients RFA (group I), 45 EVLA 1470-nm radial fibre (group II), and 45 EVLA 1479-nm linear fibre (group III). Patients' demographics, CEAP classification, mean linear endovenous energy density, average vein diameter, and length of ablated vein were comparable between the three groups. No major complications were observed post-operatively. Endothermal heat-induced thrombosis was observed in two patients in group I, one patient in group II, and two patients in group III (4.4% vs. 2.2% vs. 4.4%, respectively, $p > 0.5$). Minor complications such as ecchymosis and tenderness were similar in all groups at all visits. The GSV occlusion rate at 12 months was 93% in group I, 93% in group II, and 95% in group III ($p > 0.5$). During follow-up, all patients showed a significant improvement in all domains compared to postoperative assessment ($p < 0.05$). VCSS was more improved in group II at one week ($p = 0.02$). CIVIQ pain score was more improved in 1470-nm radial fibre patients at seven and 30 days after treatment.

Conclusions: Endothermal venous ablation using the RFA and 1470-nm radial or linear fibre laser are equally effective and safe modalities for the treatment of GSV reflux. EVLA with the 1470-nm radial fibre showed better outcomes in terms of early postoperative VCSS and pain CIVIQ scores. However, clinical and quality of life improvements were similar after 30 days in all groups during the first post-operative year.

ENDOVENOUS LASER ABLATION IN PATIENTS WITH VENOUS ANEURYSMS AND LARGE DIAMETER OF GREAT SAPHENOUS VEIN

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Objectives: Endovenous laser ablation (EVLA) is a commonly used technique of treatment for patients with varicose veins. The majority of scientific research evaluating the clinical effect of EVLA concerns the diameter of the great saphenous vein (GSV) not exceeding 13 mm. There are controversial opinions about the efficacy of EVLA in GSVs of larger diameter. There are limited data about attempts of endovenous treatment of venous aneurysms in the literature. An aneurysm can be defined as an isolated dilatation of any vessel. Aneurysms may occur in any part of the vascular system. The definition of venous aneurysm remains controversial because there is no precise size criterion. According to different authors, venous aneurysm can be defined as an isolated segment of venous dilatation 1.5- to 2-times the normal size of contiguous vein or 3-times the size of the normal vein. Venous aneurysm can be isolated or be contained within a segment of varicose vein. Venous aneurysms typically occur on extremities, either in the superficial or deep venous systems. The superficial venous system aneurysm incidence is described at around 0.1%. Types of venous aneurysms include saccular and prejunctional. The most common complications in GSV aneurysms are deep venous thrombosis, thrombophlebitis, pulmonary embolism, rupture, and focal peripheral neuropathy. The presentation describes the experience of endovenous laser treatment of patients with uncomplicated venous aneurysms and large diameter of GSV.

Material and methods: GSVs with diameter exceeding 14 mm were defined as large. A local two-fold increase in the diameter of the vein was considered as venous aneurysm. A retrospective review of patients who underwent EVLA between January 2016 and December 2018 was conducted. A total of 685 protocols were reviewed. There were 207 (30%) cases with large GSV (64 men (31%) and 143 women (69%), mean age 52.8 years, range 36.2-72.8 years). Venous aneurysms were diagnosed in 34 (4.9%) patients. Three patients had saccular type, and 31 patients had prejunctional type. The procedure was performed using a radial laser fibre and 1470-nm laser under tumescent anaesthesia. The follow-up period was 3-6 months.

Results: Mean GSV diameter was 16.5 mm before ablation. The largest diameter was in saccular aneurysms (28, 31, and 34 mm). The closure rate was 100% in this group. Complications occurred in eight patients (3.9%). The most common complication was paraesthesia – six (2.9%) cases. In another two (1%) cases thrombophlebitis was diagnosed. There were no major complications. Failure of closure was seen only in one (0.48%) case.

Conclusions: GSV aneurysms can be associated with a thrombophlebitic process and risk of pulmonary embolism. Patients presenting with the GSV aneurysm containing thrombus warrant surgical intervention. EVLA should be used as an alternative to surgery in cases of non-thrombosed venous aneurysms, to avoid thrombus formation. It is an effective and safe procedure in the treatment of patients with venous aneurysms and large diameter of great saphenous vein. This method has low risk of serious complications.

ENDOVENOUS LASER ABLATION WITH A 1940-NM LASER AND RADIAL FIBRES IN VARICOSE VEIN SURGERY,: TWO YEARS OF FOLLOW-UP

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Objectives: To demonstrate the outcome and side effects after endovenous laser ablation (EVLA) of refluxing great saphenous vein (GSV) with a 1940-nm diode laser (biolitec) and 2ring radial fibre (ELVeS Radial 2ring™, Biolitec).

Material and methods: Between February 2016 and March 2017, 100 saphenous veins GSV of 100 consecutive patients were treated by EVLA for GSV incompetence with a 1940-nm laser by using a 2ring radial fibre, 8 W power, and continuous fibre pullback without using compression therapy after treatment. Mean LEED was 69 J/cm and EFE 38 J/cm^2. EVLA was performed under tumescent anaesthesia, additional miniphlebectomies were not applied. All patients were examined clinically and with duplex ultrasound prior to intervention and at the follow-up visits at day 10 (D10), day 180 (D180), and after two years (D720), for complications, occlusion, flow, and reflux in the treated vein segment. The clinical evaluation included clinical CEAP, VCSS, presence of recurrent varicose veins, and patient's satisfaction.

Results: After an average follow-up period of 10 days 96 treated patients (96 GSV) were reinvestigated, after six months (SD 5) 96 treated patients (96 GSV) were reinvestigated, and after 25 months (SD 5) 92 treated patients (92 GSV) were reinvestigated. Four patients were lost to follow-up after six months, and an additional two patients after two years. Up to two years of follow-up, all treated veins remained occluded. After two years 79 patients were very satisfied with the method, 12 were satisfied, and one was fairly satisfied. In one case EHIT II was observed at 10 days of follow-up, but no severe complications such as deep vein thrombosis occurred. Average pain score during intervention was 1.8, on the day of the intervention was a 1.5, during first 10 days was reduced to 0,9. Intake of painkillers during the first 10 days was on average one tablet (SD 2.8). Discussion: In this prospective follow-up study with 100 consecutive patients and 100 treated GSVs, a high occlusion rate of 100% could be demonstrated two years after treatment. In comparison with other studies using lower wavelengths postoperative pain was reduced. Taking the very low pain levels and complication rate into account, post-treatment compression is not necessary if modern treatment devices are used.

Conclusions: EVLA of GSV with a 1940-nm diode laser and radial fibres is a minimally invasive, safe, and efficient therapy option with a very high success rate and a very low level of periprocedural pain.

LASER CROSSECTOMY VERSUS INFRA-EPIGASTRIC CLOSURE – RANDOMISED STUDY

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Objectives: In today's endovenous approaches, the GSV is ablated with a "safety distance" to the junction, sparing all other branches and thus leading to a considerable number of recurrences, in particular consecutive AAGSV insufficiencies. Consequently, additional treatments are required – potentially more frequently than after surgical crossectomy. Should ablation of non-refluxive AAGSV be routinely included, or are technical modifications required? A prospective randomised trial was performed to clarify the conditions for distinguished AAGSV strategies.

Material and methods: 240 consecutive patients with GSV insufficiency (C2-C6; d = 6.5-17.8), reflux origin from the SFJ (destroyed or malfunctioning terminal valve), non-refluxive AAGSV, and no other refluxive branch of SFJ were selected for endovenous laser ablation (EVLA, 1470 nm, radial, 50-80 J/cm). Cases were randomised to two groups: A: EVLA starting at the femoral vein level ("laser crossectomy"), or B: GSV EVLA starting below the epigastric vein (EV) junction. Both procedures were combined with ultrasound-guided coaxial perivenous local anaesthesia (CPLA). Ultrasound follow-up was performed after one day and after one, six, 12, and 24 months.

Results: GSV occlusion was obtained in all cases, but with different morphology: Laser crossectomy (group A) showed no stump (88/120, 73.3%), minor stumps < 5 mm (14/120, 11.7%), or moderate stumps (5-17 mm, mean 11.5 mm, 18/120, 15%, at one-month exam); 118/120 (98.3%) entries of AAGSV were covered. In group B, GSV vein stumps of 8-31 mm length, mean 23 mm, were present in 120/120 cases. AAGSV entry was covered in 13/120 cases (10.8%). Within two-year follow-up, AAGSV insufficiency was detected in 5/120 cases (4.2%) of group A and 26/120 (21.7%) of group B ($p > 0.01$). Just 1/120 (A) and 6/120 (B) cases were clinically relevant.

Conclusions: Consideration of AAGSV anatomy is crucial for the right choice of strategy. "Laser crossectomy", even if attacking just the GSV, is more effective in preventing secondary AAGSV reflux than techniques leaving stumps. Further studies will have to detect factors of AAGSV vulnerability, like the diameter or previous phlebitis, to consider primary ablation in selected cases.

ENDOVENOUS LASER THERAPY OF THE GSV: THREE-YEAR RESULTS OF A RANDOMISED PROSPECTIVE STUDY COMPARING 0 AND 2 CM ABLATION DISTANCES FROM THE DEEP VEIN

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Objectives: In the last 20 years endovenous thermal ablation has developed as a gold standard in the treatment of insufficient saphenous varicose vein. Nevertheless, the influence of an untreated proximal segment of the target vein on the development of reflux and recurrence after thermal ablation of refluxing great saphenous vein (GSV) remains unclear.

Material and methods: Between April 2013 and January 2016, 146 legs in 146 consecutive patients were treated by EVLA with a 1470-nm diode laser for GSV incompetence by using a 2ring radial fibre. All patients were randomised into two groups. In group 0 ablation was started from the level of deep vein, and in group 2 it was 2 cm below the deep vein. Investigations where performed clinically and by duplex ultrasound prior to intervention (screening visit), on the day of intervention (D0), and at follow-up visits on day 14 (D14), 90 (D90), and 900 (D900) after the procedure for side effects, complications, occlusions, reflux, and recurrences. The primary endpoint of this study was reflux in the SFJ (stump left and AASV) after three years. Secondary endpoints were VCSS, CEAP improvement, pain, and complication rates between two groups.

Results: At day 900, 35 patients were lost to follow-up: 19 in group 0 and 16 in group 2. There was no statistically significant difference in VCSS and CEAP improvement between the two groups at any time point of follow-up. Characteristics of pain and necessity to use painkillers did no differ between groups. 76% of patients did not take any painkillers at any time after the procedure (no difference between groups). There was no difference in the diameter reduction 3 cm below the SFJ, but a statistically significant difference was noted according to the greatest diameter of the stump: 0.41 cm group 0 and 0.60 cm group 2 ($p < 0.001$). Reflux in the anterior accessory saphenous veins (AASV) was observed in 8% of group 0 and 14% of group 2. Reflux in the stump was detected in 4% of group 0 and 19% of group 2 ($p < 0.05$). There was no difference between two groups according to satisfaction with treatment at any time point. Proximal clinical recurrent varicose veins were observed in group 2 in 9.6% of group 0 and in 15.25% of group 2, respectively ($p < 0.05$) and was related to reflux in the stump and/or AASV.

Conclusions: There was no difference between the two groups of patients according to satisfaction with treatment. VCSS and CEAP improvement was equal in both groups. Also, complication risk was low in both groups. Pain level and usage of painkillers were the same. However, the long stump of the GSV was associated with higher risk of development of proximal reflux and recurrences in more long-term follow-up.

CANNULAS ALLOW TUMESCENT ANAESTHESIA TO BE PERFORMED MORE SAFELY AND RAPIDLY

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Objectives: Pump usage has reduced the duration of endovenous thermal obliteration. However, the threat of needle damage to the vein, nearby nerves, and, most importantly, intravenous administration of the anaesthetic solution has remained. Unrecognised intravenous injection of anaesthetic with a pump is a technical error and carries risks of cardiac abnormalities of the patient.

Material and methods: We used a blunt cannula with circular holes for infiltration anaesthesia with a diameter of 1.6 mm and a length of 150 mm. After introduction of the guidewire, prior to the introducer and the fibre placement, the cannula was inserted through the puncture hole of the skin. Under ultrasound control, with a small effort, the cannula punched the superficial sheet of the fascia and made it possible to create tumescent anaesthesia in the immediate vicinity of the vein without the slightest risk of its puncture. After installing the light fibre inside a vein of more than 150 mm, an additional puncture hole was required for insertion of the cannula, which was also performed with an 18G needle. Through this sole opening, the cannula could be carried out both in the antegrade and retrograde directions. Patients were randomly divided into two groups of 20 each. In the main group, we used cannula. In the control group, we used a needle 21G (0.8 x 40 mm). Operations were performed by two phlebologists. The average time of completion of tumescent anaesthesia was calculated in seconds, and short episodes of an intravenous anaesthetic were considered, which was evaluated visually by the ultrasound. The length of the obliterated vein was measured along the length of the fibre after its extraction. Both parameters were calculated per 1 cm of the vein.

Results: The average time of tumescent anaesthesia in the main group was 22 sec/cm of the vein, and in the control group 34 sec/cm ($p < 0.05$). In the control group, an average of 0.047 episodes of intravenous administration of anaesthetic in per 1 cm of vein were recorded; in the main group, there were no such episodes.

Conclusions: The use of a long blunt cannula for tumescent anaesthesia reduces the time to perform tumescent anaesthesia and is not accompanied by the risk of intravenous anaesthetic injection.

"SWIFT" RADIAL FIBRES FOR ENDOVENOUS LASER ABLATION – A PRELIMINARY STUDY

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Objectives: Endovenous laser ablation (EVLA) is one of the treatment options for lower limb varicose veins. Recent development of

newer optical fibres requires clinical studies to explore the technical aspects of their use and to define the optimal energy parameters in EVLA. The aim of the study was to evaluate the effectiveness, safety, and technical aspects of EVLA with "Swift" radial optical fibres in the treatment of lower-limb varicose veins.

Material and methods: A prospective single-centre study was carried out. A total of 110 procedures of EVLA in the superficial venous system (great saphenous vein, small saphenous vein, accessory saphenous veins, perforating veins) were included in study. A new type of radial optical fibre ELVeS-radial-swift™ (BiolitecAG) on a 1470-nm wavelength diode laser was used. Selecting this type of fibre, the ablation energy parameters and the fibre extraction method were left to the operator's discretion. The technical features of the "Swift" optical fibre are: radial emission of laser radiation, 400 microns radial fibre diameter, and 1.5 mm scattering tip diameter. Vein puncture was performed with a 14G catheter, without using an introducer. The physical condition of the fibre was visually evaluated after each EVLA. The clinical outcome was assessed with physical examination and duplex scan on days 1-4 and then 30 days post intervention.

Results: all procedures were acutely successful, and the obliteration rate was 100% in short-term follow-up. Mean power was 6.1 ±0.61 (4.7-9) W, with average energy of 2873 ±1671 J per EVLA procedure. In nine patients, EVLA was simultaneously performed in multiple venous trunks (3-4 subcutaneous veins) using a single fibre, with average total energy of 8810 ±1202 J. The mean diameter of the subcutaneous veins was 8.9 mm (5-20 mm). No cases of fibre fragmentation or disintegration were observed. In two (1.8%) cases, carbonisation of the fibre glass tip was seen after prolonged ablation in post-thrombotic veins with 7 and 8 W power and 210 J/cm and 161 J/cm LEED, respectively.

Conclusions: EVLA with "Swift" radial fibres is a safe and effective option for treating lower-limb varicose veins. It does not require the use of an introducer, which simplifies the procedure and has potential cost benefit. This is the first study describing the clinical use of these fibres.

THE EFFECT OF SUCCESSFUL ULTRASOUND-ACCELERATED, CATHETER-DIRECTED THROMBOLYSIS ON PREVENTING POST-THROMBOTIC SYNDROME

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Objectives: Based on the 'open vein hypothesis', ultrasound-accelerated, catheter-directed thrombolysis is considered a promising treatment modality for early thrombus removal and prevention of post-thrombotic syndrome in patients with acute iliofemoral deep-vein thrombosis. Because the degree of residual vein occlusion influences the risk of post-thrombotic syndrome, the preventative impact of ultrasound-accelerated, catheter-directed thrombolysis might depend on its ability to achieve successful recanalisation.

Material and methods: Post-hoc analysis of an assessor-blinded, open-label, multicentre, randomised, controlled trial was performed to assess the success rate of additional ultrasound-accelerated, catheter-directed thrombolysis (including adjunctive procedures) in restoring patency after acute iliofemoral deep vein thrombosis and its relation with the development of post-thrombotic syndrome at 12 months. Successful thrombolysis was defined as a regained patency of ≥ 90%. Subsequently, the proportion of post-thrombotic syndrome one year after the acute event was compared between patients having received successful thrombolysis and patients having received conventional treatment only.

Results: Ultrasound-accelerated catheter-directed thrombolysis was performed in 77 (50.7%) patients, of which 41 (53.2%) were considered successful. The κ on inter-observer variability was 0.69 (95% BI 0.47-0.83). A total of 74 patients received conventional treatment only (49.3%). Post-thrombotic syndrome developed in 35 (30.7%) patients: nine (22.5%) in the successful thrombolysis group vs. 26 (35.1%) in the control group (p = 0.16). A lower Venous Clinical Severity Score was seen in successfully thrombolysed patients: 3.50 ±2.57 vs. 4.82 ±2.74, respectively, (p = 0.02). Quality of life according to the EQ5D appeared higher in patients with successful thrombolysis: 40.2 ±36.4 vs. 23.4 ±34.4 (p = 0.007). The other quality of life questionnaires used showed no differences between groups at 12-month follow-up. Post-thrombotic syndrome developed in 13 (37.1%) of the patients with unsuccessful thrombolysis. When comparing successful vs. unsuccessful thrombolysis, no difference in the proportion of post-thrombotic syndrome was seen (p = 0.17) but its severity was significantly lower in those successfully treated: Total Villalta score (p = 0.045); Total Venous Clinical Severity Score (p = 0.025); moderate severity (p = 0.011); and moderate/severe post-thrombotic syndrome (p = 0.032). Multiple dimensions from both generic as well as disease-specific quality of life questionnaires differed significantly between groups in favour of those successfully treated: SF-36 Social Health (p = 0.011), SF-36 Role of Physical limitations (p = 0.015), SF36-Pain (p = 0.012), EQ5D (p = 0.001), VEINES-QoL total score (p = 0.045), and the VEINES-QoL intrinsic score (p = 0.002).

Conclusions: A successful recanalisation (regained patency of ≥ 90%) does not limit the proportion of post-thrombotic syndrome at one year in patients with acute iliofemoral deep-vein thrombosis compared to conventional treatment alone. However, it seems to result in a reduced severity of symptoms and a higher quality. When comparing patients with successful thrombolysis to those whose thrombolytic treatment was considered unsuccessful, post-thrombotic syndrome was significantly less severe and quality of life was higher in multiple aspects.

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NO ULCER TREATMENT WITHOUT COMPLETE HAEMODYNAMIC ANALYSIS!

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Objectives: According to the SVS-AVF definition, a venous ulcer has an open skin lesion of the leg or foot that occurs in an area affected by venous hypertension. Although we doubt that venous hypertension is the cause of the problem, it is at least a part of the related manifestations, and solving haemodynamic problems should allow us even to normalise the metabolic conditions of ulcers.

Material and methods: In a prospective single-centre study we examined 110 patients (58 f, 62 m) with active (n = 39) or healed but painful ulcers (n = 71) for options of endovenous therapy. Ultrasound findings were video recorded and analysed by three independent investigators. In case of eligibility for treatment (clear determination of haemodynamic disturbance, options for puncture/access, no contraindications, informed consent), depending on anatomy, either laser ablation (saphenous veins including junction) or biomatrix sclerofoam (perforators, tributaries, deep lower leg veins) were performed. Follow-up including clinical examination and ultrasound was performed after two weeks and three, six, 12, and 24 months.

Results: The most frequent pattern of haemodynamic disturbance was valve damage of superficial veins and associated perforator and connected lower leg deep veins (n = 48, 34.5%), followed by superficial veins and connected perforators without deep vein damage (n = 29, 23.6%). All detected segments with reflux, including single deep lower leg veins, were successfully treated (total closure, no complications). All active ulcers healed within 3-9 months (39/39). All cases with healed but painful ulcers improved greatly to no more pain (17/19, 89.5%) or minor discomfort (2/19, 10.5%)

Conclusions: Venous ulcers are not all the same, but the majority (all in this study) seem to be eligible for endovenous haemodynamic correction. Ulcers related to epifascial reflux just need epifascial repair. Those related to single deep vein lower leg reflux might just need local ablation. Ulcers due to pelvic obstruction were not apparent in this study, but most of them should improve after recanalisation/stenting. Ulcers related to femoral or popliteal vein reflux or muscle veins remain

a challenge with no clear endovenous option, except future femoral neovalve creation or implantable valves. Due to this experience, most venous ulcers must be regarded as preventable or, if present, treatable by endovenous means in the first instance, under the condition of state-of-the-art analysis of haemodynamics.

UPDATE OF NEGATIVE PRESSURE WOUND THERAPY FOR VENOUS LEG ULCERS

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Negative pressure wound therapy (NPWT) is a novel treatment modality dedicated especially to the management of complicated wounds resistant to traditional treatment. Its positive effect on the wound environment is reflected by the fact that active drainage improves local vascularity and granulation and decreases bacterial colonisation and tissue oedema, also causing mechanical contraction of the tissue. Despite the fact that venous leg ulcer (VLU) fulfils the criteria of complicated chronic wounds, the majority of international medical organisations dealing with phlebology do not recommend NPWT as standard therapy for leg ulcers resulting from venous insufficiency. Nevertheless, there are some reports in the literature reporting a positive impact of topical negative pressure use on the effectiveness of the VLU closure. They were summarised in the recommendations issued by International Expert Panel on Negative Pressure Wound Therapy (NPWT-EP), stating that if compression therapy is not efficacious, NPWT should be used to prepare the wound for surgical closure or to progress to wound closure by secondary intention. Based on a literature search and the author's own experience, herein is presented the current status of knowledge of the NPWT application and its potential perspective for the efficacy improvement of the different aspects of VLU local treatment. In the discusssion the influence of hypobaric therapy on wound bed preparation by means of conducing should be mentioned cleansing mechanism. The explanation can be found in the active drainage phenomenon that decreases bacterial load and thus helps fight local infection. On the other hand, sub-atmospheric suction has the potential to generate proper fluid balance by the effective removal of the exudate from venous ulcer and its close vicinity. This also positively affects inflammatory conditions of surrounding tissue and the degree of oedema. The unique structure of foam occlusive dressing facilitates a moist environment, simultaneously providing proper oxygen diffusion through the drape membrane. Additionally, there is strong evidence of a beneficial effect of NPWT on the proliferation phase of chronic wound healing. Hypobaric conditions create local hyperaemia and thus improve microcirculation and stimulate neoangiogenesis. It also promotes acceleration of fibroblasts mitosis, resulting in faster granulation tissue formation. Moreover, mechanical contraction of the elastic structures in reaction to the vacuum pressure decreases the volume of the defect requiring reparation. Lastly, NPWT was proven to have a beneficial effect on skin grafting procedure in different wound types, including VLU. Negative pressure exerted over the meshed graft improves its adherence, immobilisation, and ingrowth of new vessels from the wound bed site, resulting in a higher graft take ratio.

In conclusion, the presented update gives information about many potential applications of NPWT for the management of the multifaceted problem of VLU. Initial reports from the literature should encourage the next investigators to conduct further studies intended to define the real value of NPWT in the treatment of VLU, and perhaps to reconsider current recommendations.

TOPICAL SEVOFLURANE AS A NEW TREATMENT MODALITY FOR PAINFUL VENOUS LEG ULCERS

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Objectives: To describe the emerging use of the inhalational general anaesthetic sevoflurane as an off-label topical analgesic for painful venous leg ulcers.

Material and methods: Narrative review of the literature, with no language restriction.

Results: Eight papers reporting clinical cases or series of cases were found. The table summarises the analgesic profile of topical sevoflurane in 134 patients reported, who accumulated approximately 1744 days of treatment for painful leg ulcers of venous or mixed aetiology.

Values are expressed as mean ±SD or as median (interquartile range). *indicates refractory pain. **indicates neuropathic pain. Sevoflurane was very effective in controlling rest pain in all patients, even when a neuropathic component was present. Pain reduction was rapid, intense, and long-lasting. Remarkably, sevoflurane was also effective for controlling pain that had been refractory to other conventional systemic analgesic treatments. Sevoflurane tolerance could be reasonably ruled out since each further application was followed by the same analgesic response, even for long-term treated patients. The intense and prolonged analgesic effect usually allowed for dosage reduction of other systemic analgesics; as a consequence, their related adverse effects ameliorated or even ceased. Sevoflurane was slightly less effective at controlling pain during debridement. Some patients required a new irrigation to complete debridement; nonetheless, debridement could not be completed in a very small percentage of cases. Nearly all treated ulcers showed reduction in both size and depth, and even complete ulcer healing was achieved in some cases. Concerning safety, mild pruritus in the surrounding skin has been the most frequent adverse effect reported so far. Of interest, no patient has experienced any systemic adverse effect. Quality of life and functional capacity were found to improve in a paper specifically evaluating these topics.

Table 1.

Author/year (Journal)	Patients (N)	Baseline pain (0-10)	Pain after sevoflurane (0-10)	Onset of effect (Min)	Duration of effect (H)	Days of treatment	Ulcer evolution/ Debridement
Gerónimo-Pardo/2011(Phlebologie)	1*	8	4	2	12	16	Ulcer completely healed
Martínez-Monsalve/2013 (Heridas y Cicatrización)	9	7.4 ±0.5	2.1 ±0.6	< 5	10.7 ±3.0	76	4 ulcers completely healed
Fernández-Ginés/2015(MEDIPAL)	1*	9**	< 4	3	> 24 h	35	Ulcer nearly healed
Fernández-Ginés/2017 (Am J Health-Syst Pharm)	9	7.4 ±1.6	Reduction of 5.7 ±2.0	3.2 ±1.2	9.6 ±4.7	79.8 ±73.4	Size reduction
Imbernón-Moya/2016(Int Wound J)	1	Intense	Mild	10	8	21	Ulcer nearly healed
Imbernón-Moya/2017 (EJVES Short Reports)	30	7.1 ±2.0	Mild	3.9 ±1.5 (Range: 2-7)	12.0 ±2.9 (range:8-18)	450	Size reduction
Amores-Valenciano/2018 (Emergencias)	1*	10**	2	< 1	> 24 h	≈365	Ulcer completely healed
Martínez-Monsalve/2019(J Vasc Surg)	Venous: 17	6 (5-6)	1 (0-3)	2 (2-3)	10 (8-12)	17	Debridement: 100%
	Mixed: 44	7 (6-8)	2 (1-3)	2 (1-3)	9 (7-11)	44	Debridement: 98%

Conclusions: Based on the available evidence, off-label topical sevoflurane appears to be a valuable and effective analgesic alternative for the treatment of painful venous leg ulcers because it causes a rapid, intense, and long-lasting analgesic effect with a good safety profile. However, evidence accumulated so far is sparse and more studies are needed to confirm these promising results.

PROFESSIONAL MEDICAL NETWORKING IN LYMPHOLOGY AND PHLEBOLOGY – THE PATIENT IS THE FOCUS

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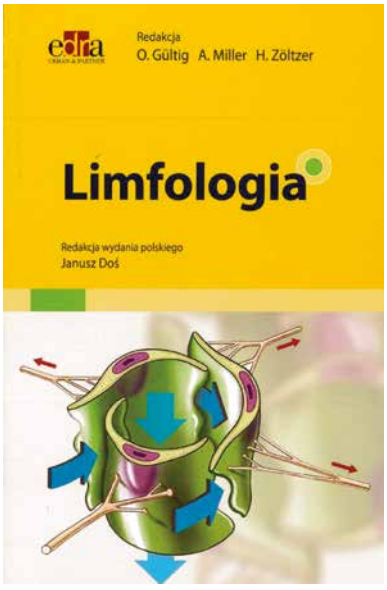
Forty years ago, patients with primary or secondary lymphoedema or advanced venous diseases (CEAP 4-6) in Germany could only be treated as inpatients in a specialist clinic.Lymphologic med. Training started in 1999 a program of curricular advanced training for physicians concerning anatomy, pathology, diagnostics, and therapy of all lymphostatic oedemas (three weekends, 51 credit points). This was necessary because in Germany 4 million people suffer from chronic lymphostatic oedemas (current state), and this field of study is still not taught in medical studies. Meanwhile, more than 900 physicians in this field have been trained by Lymphologic in cooperation with the German Society of Lymphology. In contrast, Lymphology/Phlebology and Complete Decongestive Therapy (CDT) have always been very popular in Germany. Today we have more than 70,000 physiotherapists who have further education in this field. For this reason, in many regions of Germany (more than 90) Lymph/Phleb-Networks were founded, in which all med. occupations (med. doctors, physiotherapists, nurses, compression stocking providers), and the patient him/herself, work closely together. In this way, the decongestion phase of the CDT (daily treatment) as well as professional wound management can be carried out on an outpatient basis. In addition, these networks, supported by the industry in phlebology and lymphology, offer countless information seminars for patients. In these events patients also learn a lot about the therapy-accompanying self-management of their disease. The work of this network is also supported by the non-profit organisation Lymphologicum- German Network e.V. Here the patient receives easily understandable guides and the magazine "Lympholife". The scientific textbook "Guide Lymphology" (since 2018 also in Polish translation, ISBN 978-83-65835-17-8 www.edraurban.pl) accompanies this network work, because all lymphangiological and phlebological diseases are always shown in the entire medical supply chain. This gives each medical profession a comprehensive overview of how successful teamwork should be organised.



Also, the special self-management of the patient is presented for every disease picture. These chronic lymphatic oedemas are always about the competent treatment of this disease over 365 days of the year. Only in particularly severe cases is inpatient treatment in a specialist hospital necessary today.

As a result, the treatment has become much cheaper. The teamwork of all participating professions in a regional network also gives pleasure. However, for all, the focus is on the patient and his/her recovered quality of life.

INVESTIGATION OF THE LYMPH NODE VENOUS NETWORK OF THE GROIN BY PHLEBOGRAPHY MULTISLICE AND ITS PARTICIPATION IN PRIMARY INSUFFICIENCY OF THE GREAT SAPHENOUS VEIN

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Objectives: The purpose of this work is to describe the anatomy of the lymph node venous network of the groin and evaluate its participation in primary insufficiency of the great saphenous vein (GSV) through multislice 3D phlebolynfomography.

Material and methods: Analysis of two hundred phlebographies by multislice tomography carried out in patients with primary and recurrent venous insufficiency in lower limbs in a five-year period.

All patients were also studied by Doppler USG.

Results: The anatomical study of this venous network was possible in 100% of the TC phlebographies performed through the technique used. The dilation and the reflux by dystrophical pathology of the lymph node venous network is the cause of primary venous insufficiency from the GSV and its anterior accessory GSV.

Volumetric image and maximum projection intensity showed its connection with the superficial and deep venous system.

Conclusions: Multislice 3D phlebography is of great utility in the study of the lymph node venous network of the groin anatomy. Its participation in the primary insufficiency of the great saphenous vein was shown. We highlight its importance as a cause of recurrences, making a differential diagnosis with neovascularisation. Doppler USG complements haemodynamic reflux information.

REPORTING OUTCOMES OF EVLA OF GSV – PERSONAL EXPERIENCE WITH 1470-NM LASER DIODE WITH BARE FIBRES

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Objectives: The heterogeneity of reporting outcomes of EVLA is alarming. There is a lack of adherence to international bibliography.

Material and methods: Type of study: prospective, nonrandomised, observational case series. Laser type: diode 1470 nm; fibre: naked, linear emission; compression treatment: GIC protocol. Technique of the procedure: percutaneous, under ultrasound guidance, in outpatients with local anaesthetic and sedation. Study follow-up: 24 months. Study population: 406 GSV Laser physical parameters: LEED: 30 J/cm

Results: The results depend on multiple factors that, if not considered, are causes of bias: target vein specification, the EVLA results of GSV and SSV must be reported separately, report of initial severity of the clinical cases, distribution according to acronym C of the CEAP (the highest percentage was class C3 – 56%), it is currently recommended to report the results by specific clinical category, baseline characteristics – the results are worse in male, elderly, and higher BMI patients because they are related to more severe pathology. Study population: mean Age: 53.72 years, gender – F 78%, average BMI: 27.9. Degree of reflux: severe – 89%. Loss of follow-up – 24 months: 37 patients (9.11%). Primary results – degree of severity: 1) Clinical improvement – improvement of CEAP is not the best choice. The static measurements are not recommended for longitudinal

studies. Venous Disease Severity Score/VDSS/is the best tool (pre-processing score: 7.3, seven days: 4.9, first month: 4.2, third month: 3.9). 2) Quality of life Qol: CIVIQ-20 – improvement of the scores of all the domains (pre-processing score: 37.7, three months postoperatively: 17.5; the improvement of the average global score: 53.8%). 3) Evaluation of recurrences – they are based on a pre- and post-procedure report of the presence or absence of reflux in other sectors of the venous systems through Affectation Score of different Segments of the Venous system VSDS. To evaluate the results of treatment of varicose recurrence: classification REVATA. 4) Evaluation of the aesthetic results – they are assessed by the disappearance or reduction in the size and visibility of varicose veins by photographing the treated areas. 5) Cost benefit relation – questionnaire of acceptance of the procedure by the patient. Likert scales. PROMs. Secondary result by DUS Efficacy: Anatomical success/obliteration: seven days – 99.51%, one month – 98.51%, three months- 96.25%, six months – 95.13%, 12 months – 93.84%, 24 months – 93.15%. Repermeabilisation: seven days – 0.49%, one month – 1.49%, three months – 3.75%, six months -4.87%, 12 months – 6.16%, 24 months – 6.85% (all were: partial: less than 50% failure and segmental: more than 5 cm of length). Safety complications: Pain rate: mild – 90.14%, moderate – 9.86%, severe – not detected. Bruising score (five-point grading system): mild – 87.19%, moderate – 12.81%. Induration: 100%. Superficial thrombophlebitis:1.72%. EHIT: Type 1: 99.51%, Type 2: 0.49%, Type 3 and 4: were not detected. Paraesthesia: 3.67%. Pigmentation: 0.73% – all were minor.

Conclusions: Biases were demonstrated in the design of clinical trials, and significant variations were seen in the report of outcome measures. It is necessary to achieve greater adherence to the reporting standards of results. This will allow greater objectivity in the evaluation of the new technologies. A combined report of primary and secondary results is recommended. It was not proven that anatomical results correlate with clinical results.

VENOUS ULCER TREATMENT WITH THE ADJUSTABLE VELCRO INELASTIC SYSTEM

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Objectives: Compressive therapy has for several years been the main therapeutic strategy for the treatment of venous ulcer, and has proven to be able to attack venous hypertension, improve microcirculation, and decrease proinflammatory factors in the endothelium, allowing healing of the ulcer, for which reason it has been catalogued with the degree of recommendation I. Currently we have inelastic compression systems made with an adjustable Velcro material, which have been shown to increase the venous work pressure favouring the activity of the muscular pumps and increasing the return to the deep venous system in a primordial way. The aim of the study was to demonstrate the effectiveness of inelastic compression in the treatment of venous ulcers using an adjustable Velcro system, which allows ulcers to heal, attacking the pathophysiology of chronic venous disease, and generating a cost benefit.

Material and methods: An inelastic system was placed on the lower extremities that presented venous ulcers with a variable evolution from two months to four years, presenting different diameters associated with moderate to severe oedema, pain, and variable lymphorrhoea, clinically without local infection. In all patients the Ankle-Brachial Index was measured.

Results: The healing of the venous ulcers was achieved using an average pressure of 30-40 mm Hg for a time similar to elastic and multilayer systems, appreciating a significant decrease in pain after its application with reduction of oedema in the first 24 hours of 15-20% and at seven days thereafter from 20 to 25%, showing good tolerance. After healing, patients continued with elastic compressive therapy type II and III.

Conclusions: Adjustable Velcro inelastic systems prove to be effective and safe for the treatment of venous insufficiency of stage CEAP C6, allowing tissue healing, significantly reducing pain and oedema, with similar results to multilayer therapy and with a true cost benefit for the patient in the long-term.

PELVIC CONGESTION SYNDROME

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Pelvic congestion syndrome (PCS), a disease that it is included in general pelvic venous incompetence (PVI), is manifested by pelvic pain of variable intensity, which is heightened before or during menses, and it is prolonged for more than six months. It is characterised by an incompetence of the pelvic veins, which are incapable of carrying the venous flux in the correct way; this is centripetal flux. There is an increase in the number and calibre of intra pelvic venous structures of varicose morphology, tortuous, ecstatic, derivative, and delayed flow. It is a haemodynamic disorder often caused by pelvic venous hypertension (PVH). This syndrome may or may not be accompanied by other symptoms such as low back pain, dyspareunia, or dysuria, and by the appearance of vulvar or atypical varicose veins in the lower limbs. Because the pelvic venous system and the lower limbs are a joint functional unit (subdiaphragmatic), it can be considered that the chronic venous insufficiency affects the entire infra thoracic venous system, i.e. the lower pelvis and limbs. Massel and Hobs were the first to establish this relationship between the venous circulation of the lower limbs and the veins of the pelvis, but the first to mention pelvic congestion was Richet in 1875. Changes of pressure that are the cause of the PCS can have different origins. The hypertension could be caused by centripetal factors such as compressions or venous occlusions caused by thrombi, or centrifugal factors with retrograde flow due to the insufficiency of gonadal and/or internal iliac veins that are dilated and without valves. All these factors lead to varicose veins or leaks to the lower limbs. Hence, although reflux within the veins of the pelvis is not widely recognised as a cause of varicose veins of the lower limbs, in our group we believe that it is necessary to evaluate the situation of the pelvis in the study of the lower limb varicose veins because it has been demonstrated that up to 32% of cases originate in the pelvis. Thus, it is important to study gonadal axes, which can lead in a leak of the round ligament in women, or testicular vein (varicocele) in males, contributing to the PCS and pelvic varicose veins, and to assess the internal iliac veins and their tributaries, which can produce leaks or reflux through pudendal veins, obturator veins, or gluteal veins, as well as assess possible compressions that can also trigger the appearance of refluxes. In summary, if the study of varicose veins does not also involve the assessment of pelvic leak points and the condition of the pelvis in general, varicose recurrence can occur in up to 80% of cases. This does not occur due to re-permeability of the leg veins, but due to these "atypical" axes that connect the pelvis with the lower limbs.

ILIAC VEIN STENTING – DO WE HAVE A PROBLEM FOR THE SOLUTION? REAL-WORLD DATA FROM A GERMAN VEIN CENTRE

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Objectives: Interventional recanalisation has been conducted on post-thrombotically obstructed and non-thrombotically obstructed iliac veins for around 20 years. In response, manufacturers have developed stents with a higher radial force and better flexibility. Stenting chronic iliac vein occlusions has been shown to lower pain and oedema levels and heal venous ulcers with low rates of complication. American guidelines recommend iliac vein stenting for primary and post-thrombotic iliac vein obstruction at CEAP stages C3-C6 (level IB). The patency rate depends on the technical execution of the procedure. Both ends of the stent need to be placed in healthy vein segments to ensure long-term treatment success. This limits the target group to patients suffering from post-thrombotic syndrome (PTS) following isolated deep-vein thrombosis from the distal inferior vena cava to the inguinal ligament, and patients with non-thrombotic compression syndromes. Epidemiological data on PTS indicates that only a few patients profit from interventional recanalisation. Real-world register data confirms this.

Material and methods: A total of 531 PTS patients (ICD 10 I87.00) were screened between 1/2014 and 12/2017. Twenty-one patients had isolated iliac vein obstructions. Eleven were excluded due to the absence of a "landing zone", lack of compliance, or individual patient decision; hence, a total of 10 patients received intervention. The underlying thromboses had occurred one to 24 years prior. Symptoms included pressure pain and tension in the thigh during prolonged sitting, varicosis of the pudendal vein, and dyspareunia. One patient had oedema, and one suffered from venous claudication. The distal vasculature was free of post-thrombotic residuals in all patients. In nine cases the left iliac vein was stented. One case involved non-thrombotic paraneoplastic compression of the right iliac vein. Venous occlusion plethysmography, phlebodynamometry, and the Villalta score were used to assess the haemodynamics and symptoms.

Results: Only 10 of the 531 PTS patients (1.9%) were suitable for iliac vein stenting. After treatment they reported clinical improvement but no complete absence of symptoms. Three experienced stent thrombosis. Phlebodynamometry showed only minor deviations from the norm in all of the studies – both in terms of pressure reduction and replenishment time. Occlusion plethysmography revealed an improvement in venous efflux in eight of the subjects. No patient achieved values consistent with the healthy limb. The collapse of the collaterals correlated with a regression of the suprapubic varicose veins.

Conclusions: Iliac vein stenting is effective in treating PTS and non-thrombotic venous obstructions in eligible patients. The small patient cohort and realistic patency rates require prudent selection and a strict indication. Clinical and diagnostic selection criteria require further development.

ULTRASOUND-ACCELERATED CATHETER-DIRECTED THROMBOLYSIS VERSUS ANTICOAGULATION TRIAL FOR THE PREVENTION OF POST-THROMBOTIC SYNDROME: THE CAVA TRIAL

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Objectives: Despite current standard treatment, post-thrombotic syndrome is a frequent complication of deep-vein thrombosis, especially with an iliofemoral or more proximal localisation of the thrombus. According to the 'open vein hypothesis', early removal of the thrombus might preserve venous function and restore venous flow, thereby reducing the occurrence of post-thrombotic syndrome.

Material and methods: In this assessor-blinded, open-label, multicentre, randomised, controlled trial 184 patients with a first-time acute iliofemoral deep vein thrombosis were randomly assigned to either additional Ultrasound-Accelerated Catheter-Directed Thrombolysis (with or without adjunctive procedures) or standard treatment including anticoagulant therapy, compression therapy, and early mobilisation (control). The primary outcome was the proportion of patients with post-thrombotic syndrome at 12 months diagnosed according to original Villalta criteria (a Villalta score of ≥5 on two consecutive occasions at least three months apart or venous ulceration of the post-thrombotic leg) assessed by modified intention to treat.

Results: Post thrombotic syndrome occurred in 22 patients (29.3%) assigned to additional thrombolysis compared to 26 patients (35.1%) receiving standard treatment; odds ratio 0.77, 95% confidence interval (95%CI) 0.36-1.62, $p = 0.45$. Major bleeding occurred in four patients (5.2%) in the intervention group and in none in the control group, ($p = 0.29$). A total of 22, thrombotic events occurred; 17 (77.3%) in the intervention group vs. 5 (22.7%) in the control group, ($p = 0.007$). In-stent-thrombosis accounted for 12 (70.6%) out of 17 thrombotic events in the intervention group. The severity of the post-thrombotic syndrome did not differ significantly between the treatment groups at any point in time, nor did the quality of life scores.

Conclusions: In patients with acute iliofemoral deep-vein thrombosis additional ultrasound-accelerated catheter-directed thrombolysis did not result in a lower risk of post thrombotic syndrome nor in a significantly increased risk of major bleeding, but an increase in thrombotic events due to in-stent thrombosis was observed. (Funded by ZonMw The Netherlands Organisation for Health Research and Development and others; CAVA ClinicalTrials.gov number, NCT00970619)

HOW VEIN DISEASE BEGINS – INSUFFICIENCY IN CHILDREN AND ADOLESCENTS

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Objectives: Newer studies on the onset of intra- and epifascial venous disease show four major components: 1) congenital valve lesions, 2) stress-induced valve decompensation, as seen in heavy workers or athletes, 3) stasis-induced inflammatory valve degeneration, and 4) usually secondary phlebitis. Because congenital vein valve damage is the first to occur in life, it should prepare a primary pattern of an individual course of venous disease.

Material and methods: Using high-frequency ultrasound systems (Siemens Juniper, Zonare One Pro, Mindray M9, 16-23 MHz; Vevo MD, 16-32 MHz), we examined 102 children and adolescents aged 6-18 years (mean 12.5 years), 59 f, 43 m, all asymptomatic. Investigation time was limited to 15 minutes. In case of visible vein changes (protruding, more intense colour, increased diameter), ultrasound was started. Otherwise, systematic screening of saphenous veins and typical perforator locations was performed.

Results: 71/102 children (58.8%), respectively, 60/204 legs (34.8%) showed relevant venous pathology. Lesions were mainly located in the GSV: 60/204 (29.4%), vs. primary saphenous side branch varices (3.9%), SSV (3.4%), and perforator veins (1.0%). GSV at the lower leg showed 61.0% of all GSV lesions. In the subgroup of 6-8 y/o kids, 11/23 kids (47.8%) already showed relevant pathology (Fig. 1). 42.3% of all cases were related to a single valve failure. Among these, unilateral commissural mismatch was the most frequent pattern (70.0%).

Conclusions: The unexpected high incidence of detected valve lesions in children, in particular in the younger ones, should be best explained by congenital disease. It is a credit to today's ultrasound systems that even small lesions can now be detected. Now the challenge is to learn which candidates at which age might have preventive benefit from early detection, coaching, and eventually a cost-effective therapy.

THE REFLUX DURATION DEPENDS ON THE VALVE LEAFLET GAP WIDTH

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Objectives: The aim of the study is to evaluate the effect of the gap width between valve leaflets (leaflet insufficiency) on the haemodynamics and obtain dependence of the reverse flow duration on the gap width between the valve leaflets.

Material and methods: A two-dimensional computational model of the popliteal venous valve geometry was constructed and studied. Abnormal venous valves with insufficiency were modelled with different gap widths between leaflets: r/R = 0.06, 0.08, 0.3, and 0.53, where r is half of the gap width and R is the vein radius. The vein diameter was D = 10 mm and the leaflet thickness was h = 0.4 mm. An arbitrary Lagrangian-Eulerian formulation was used in the coupled model, considering two domains – specifically the blood flow and the valve leaflets. The effect of the gap width between the valve leaflets (venous valve incompetence) on the valve reverse flow (reflux) was investigated.

Results: The valve leaflets were assumed to be isotropic, linear elastic, with a Poisson ratio ν = 0.45 and Young modulus E = 2 MPa and density ρs =1200 kg/m^3. The blood was assumed to be a Newtonian fluid with density ρf = 1060 kg/m3 and viscosity μf = 0.004 Pas. A uniform velocity profile and a variation in the mean flow velocity during the cycle were specified at the inlet boundary. The cycle period T = 1.7 s. The velocity increase phase makes up 0.23T. The maximum mean flow velocity Vb max = 0.07 m/s. A constant pressure was specified at the outlet boundary. The examined flow is laminar with Reynolds number Re = ρfDV b max/μf = 185. Numerical calculation results show that the amplitude of leaflet tip oscillations with a gap width r/R = 0.06 is about 26% of the vein radius. The instant of maximum displacement is approximately in the middle of the cycle (t/T = 0.48). The amplitude of oscillations decreases with the gap width increase, and the instant of maximum leaflet displacement moves closer to the beginning of the cycle. There is practically no leaflet movement for the valve with gap width r/R = 0.53. An intense forward flow forms between the leaflets. There are two velocity maximums on the centreline of the vein with a small gap width: the first – between the leaflets, the second – between the vortices downstream the leaflets. But there is only one maximum for a big gap between the leaflets. Reversed flow is observed between the leaflets and along the vein wall. The variation in the mean flow velocity during the cycle is defined on the graph.

Conclusions: The reflux duration at the leaflet tip vicinity increases with the gap width. External correction of the valve ring allows a reduction in the duration of reflux due to the convergence of the valve leaflets, even if it is impossible to achieve their closing tightness.

ANATOMY AND 3D MODELLING OF THE POPLITEAL FOSSA PERFORATING VEINS

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Objectives: The aim of this study is to make an anatomical description of the bony venous perforators (PVs) at the knee level, which are frequently missed during investigation of patients with chronic venous disease.

Material and methods: Venous mapping of 25,000 patients and 1200 CT venographies before varix surgery form the basis of this study.

Results: Anatomically, these PVs are defined as "perforating vein feeding a varicose network of the popliteal area not connected to a tributary of SSV". Their prevalence is about 4%. Anatomically, they have four main characteristics: always located laterally from the midline; ending in the lateral aspect of the popliteal vein; on average 2 cm above the SPJ; and with no connection to the SSV

Conclusions: They are very frequently observed in REVAS after ligation of the SSV, commonly associated with other refluxing PVs and to more severe CVD (the C of CEAP). In all cases, one must look for a systolic reflux of the PV and eliminate a vicarious shunt due to a venous obstruction, in particular a Hunter's canal stenosis.

SPECIAL TYPE OF CHRONIC VENOUS DISEASE CAUSED BY VEIN INSUFFICIENCY ALONG THE COURSE OF THE NERVES

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Objectives: The goal of the analysis was to determine the frequency and types of non-saphenous varicose veins along the course of the sciatic and sural nerves. It was detected in only 1.39% of all patients with chronic venous disease (CVD), making it a rare disease with distinct signs and symptoms. The findings indicate that it is necessary to further investigate treatment options and to raise awareness within the phlebologist community worldwide about this disease.

Material and methods: Between May and December 2018, we examined 2875 patients in Normed Medical Centre with duplex ultrasound scans (DUS) and found 40 patients with varicose veins along the course of the nerves. All patients had varicose veins in the lateral and posterior aspect of the thigh and calf. During the DUS examination, we detected that these varicose veins were connected to the veins along the course of the sciatic and sural nerves, which were enlarged and had deep reflux. In each case, the anatomy of the incompetent veins, their size, association with superficial varicose veins, and the severity of the insufficiency were analysed and included in detailed reports, including the symptoms and the treatment results.

Results: From the 2875 patients, we detected 40 (1.39%) cases of varicose veins of sciatic (45%), lateral sural (67.5%), and medial sural (50%) nerves. All these patients were classified with CEAP class 2 to 5. All patients had typical CVD symptoms, and most of them (87.5%) had an intermittent sciatic or sural nerve pain in the posterolateral aspect of the leg that was irradiating to the gluteal region. Some of the patients had post-thrombotic changes of the mentioned veins, which were accompanied with trophic changes of skin near the ankles and mainly near the lateral ankles (25%). Some patients had no insufficiency of saphenous veins (47.5%), some passed saphenectomy, and had recurrence of the disease because of the insufficiency of nerves veins (20%); others had saphenous vein insufficiency as well as insufficiency of veins along the course of the nerves (32.5%), and some had signs and symptoms of pelvic varices (77.5%). Treatment was based on the clinical situation of each patient: either conservative treatment, surgical methods, or sclerotherapy were used. All patients are still under continuous follow-up.

Conclusions: Sciatic and sural nerve varices can seldom be detected – in only 1.39% cases from all CVDs. This disease is rare in medicine, and the ways of its treatment are not yet detected. Because it has special signs and symptoms, it requires detailed and long-term investigations in order to learn methods for its management and treatment.

HYBRID AASV-GSV VEIN: INCIDENCE AND PECULIAR COURSE

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Objectives: In the case of ultrasound visualisation of single saphenous trunk (SST) joining the SFJ, it is identified either as GSV or AASV (in the event of GSV hypoplasia). However, detailed study of ultrasound anatomy allowed detection of venous trunks, which do not have all the features of the abovementioned veins. The aim of this study was anatomic identification of the SST, which joins the SFJ, and which has AASV features in the proximal thigh.

Material and methods: Detailed duplex ultrasound examination was performed on 978 limbs with SFJ incompetence. 118 limbs (12.0%) were selected for further analysis, in which SST, joining SFJ, had AASV features, namely: projection over the deep vessels in proximal thigh and "empty" E-point. We assessed the configuration and length of the said saphenous trunk and also the integrity of a fascial compartment.

Results: Among 118 limbs with SST identified as AASV below the groin area, 53 (5,4%) saphenous trunks had short interfascial segment (proximal thigh) typical for AASV. However, in 65 limbs (6.6%) the saphenous trunk was longer than the proximal 2/3 of the thigh, and in all cases it had frontal curvature in a distal thigh segment, after which the location of the studied saphenous trunk was typical for GSV. The

total length of the interfascial part of saphenous trunk in the second group varied from thigh to thigh plus leg, including the curvature zone, which also was located between fascial layers.

Conclusions: In 6.6% of limbs with GSV incompetence SST joining SFJ has a "hybrid" course, being located in the proximal 1/3-2/3 of the thigh as AASV, and more distally, after a typical curvature in the frontal direction, as GSV.

ANATOMY OF THE BONY PERFORATOR VEINS OF THE KNEE

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Objectives: The aim of this study is to make an anatomical description of the bony venous perforators (PVs) at the knee level, which are frequently missed during investigation of patients with chronic venous disease.

Material and methods: A multiple series of anatomical slices of fresh cadavers injected with green latex and a series of CT venographies as well as Duplex colour investigations were used to study their precise location and the connections with the venous network of the knee.

Results: Anatomically, these PVs are commonly located anteriorly around the patella, and posteriorly in the inter-condylar grove, medially and laterally. Their connections with the popliteal vein are multiple. During Duplex ultrasound assessment, as well as CT venography, they are often ignored due to their small calibre.

Discussion and conclusions: Physiological hypothesis: At the knee level, the spongy bone of both tibia and femur epiphysis is an important place of production of red blood cells. They connect the venous system in the popliteal vein by several tiny perforators. In practice, these tiny perforators are not investigated and are ignored by sonographers. They should be distinguished from the large PVs of the tibial diaphysis responsible for varicose veins of the leg [1]. These PVs could also be linked to the so-called "phleboarthrosis" described recently [2-4]. The bony perforator veins of the knee are commonly responsible for reticular veins or telangiectasias around the knee, but they are underdiagnosed by sonographers. This explains why the injection of these cosmetic lesions around the knee frequently leads to recurrence,

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A SYSTEMATIC REVIEW OF THE RELATIONSHIPS BETWEEN VENOUS DIAMETERS, CLINICAL SEVERITY, AND QUALITY OF LIFE

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Objectives: Chronic venous disease (CVD) represents a significant impact on patients' health-related quality of life (HRQoL). To help guide further management, truncal vein diameters are recorded during duplex ultrasound assessment; these diameters can be used to determine treatment eligibility, for example by insurance companies. While some studies have shown an association between truncal diameters and both clinical severity and HRQoL scores, this relationship is still poorly characterised. This systematic review aims to synthesise the evidence in the literature pertaining to such relationships to better inform CVD management.

Material and methods: A systematic review was performed. Medline and EMBASE databases were searched from 1946 to 31 August 2018 to identify relevant articles. The reference lists of included studies were searched to find additional papers. Database searches, title, abstract, and full text screens, and reference searches were performed by two independent reviewers. Discrepancies were resolved by reference to a third reviewer. Full text studies in English reporting on the relationship between great and/or small saphenous vein diameters and clinical severity and/or HRQoL scores were included. Papers only reporting on truncal vein diameters, clinical severity, or HRQoL scores without describing their relationship and papers focusing on non-truncal veins were excluded.

Results: Eleven studies were included in this review, including a total of 2732 limbs with symptomatic C0-1 disease and C2-6 disease (range 22-681). Relationships between truncal vein diameters and both clinical severity and HRQoL scores were reported by four studies, with the other seven studies reporting on relationships with clinical severity only. Validated classification tools were used to measure both HRQoL (AVVQ, CIVIQ, VEINES-QoL/Sym, VVSymQ) and clinical severity (CEAP, VCSS). Truncal vein diameters were shown to be related to CEAP stage in seven studies; the majority of studies observed increasing diameters with increasing clinical severity. Four studies reported weak positive correlations between VCSS and increasing vein diameters. One study also reported diameters to be correlated to individual VCSS components. However, all studies included in this review failed to show any significant relationship between truncal vein diameters and any HRQoL score.

Conclusions: Current studies suggest that, in CVD, truncal vein diameters exhibit a weak association with clinical severity but not HRQoL scores, and therefore patients' perceived impact of CVD. This suggests that truncal vein diameters should not be utilised as a criterion for treatment eligibility.

THE VILLALTA SCORE IS A BETTER PREDICTOR FOR PRE-EXISTING CHRONIC VENOUS DISEASE THAN THE DEVELOPMENT OF POST-THROMBOTIC SYNDROME

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Objectives: Patients with chronic venous disease (CVD) without a history of thrombosis may show some of the same signs and symptoms as those with post thrombotic syndrome (PTS). A previous study showed that the contralateral leg of those with a first unprovoked DVT also displayed elevated Villalta scores (VS) in 40% of patients [1]. The effect of a DVT on the VS therefore appears to be unpredictable. Although the VS is a validated tool for classifying post-thrombotic syndrome (score > 4), misclassification bias may exist. We therefore set out to prospectively compare the VS and VCSS in patients with and without a history of DVT, in order to determine the degree of misclassification bias as well as any changes in VS that occurred after first development of DVT.

Material and methods: Patients with chronic venous disease were prospectively enrolled from a single vein centre over a period of 12 months. VS and VCSS were completed for all patients, as well as bilateral duplex ultrasound. Positive misclassification bias was defined as the percentage of patients identified with post-thrombotic syndrome (VS > 4 and a history of DVT) but without reflux or obstruction in the deep veins on venous duplex. Negative bias was defined as the percentage of patients identified as not having post-thrombotic syndrome (VS < = 4 or no history of DVT) but were found with post-thrombotic changes in the deep veins.

Results: 288 patients with C2 to C6 disease were prospectively enrolled, of whom 258 had no history of DVT and had a mean VS of 8.12 + 4.91, and 70% had a score consistent with having PTS. VS correlated well with VCSS in this study population. Twelve of these patients subsequently developed DVT during the course of the study, and there was no significant change in the VS. The patients with a history of DVT (n = 30) had a mean VS of 9.57 + 5.78. Of these patients, 26 had a VS ≥ 4 and would be given the diagnosis of PTS. Eleven of the 26 (42%) patients had normal deep veins on ultrasound (including pelvic veins) and represent a positive bias.

Conclusions: Although the use of the VS is used as a basis for defining PTS, the score appears to correlate well with VCSS in patients with CVD and does not significantly increase in patients from before to after the first episode of DVT. Our positive misclassification bias of 42% suggests that the use of Villalta score may heavily misclassify those with primary CVD as PTS. The value of the score was also not significantly higher in patients with a history of DVT compared to those with CVD without a history of DVT.

AIR-PLETHYSMOGRAPHY OUTPERFORMS PHOTO-PLETHYSMOGRAPHY IN MEASURING CALF VOLUME CHANGES

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Objectives: Air-plethysmography (APG) and photo-plethysmography (PPG) are functional tests quantifying chronic venous insufficiency (CVI). Their advantage over duplex ultrasound is that they both measure the degree of impairment of venous drainage, the prime function of veins. In Germany, PPG is a routine investigation whereas APG is not. Furthermore, APG measures global calf volume change directly whereas PPG utilises optics to extrapolate blood volume change in the micro-vascular bed of the skin. The objective was to compare the performance of APG and PPG in patients before and after endovenous laser ablation (EVLA) as well as in healthy volunteers.

Material and methods: The legs (n = 17) of 12 patients, median (interquartile range) age 61 (42-72) years, BMI 26.4 (23.8-32.1), clinical CEAP: C2 = 2; C3 = 4; C4a = 10; C6 = 1, before and 73 [30-89] days after EVLA were tested. The legs (n = 6) of 12 volunteers, age 51 (47-56) years, BMI 21.2 (19.3-31.1), were tested alongside to represent a healthy cohort without venous disease. A manually operated tilt-table, ranging from standing at –70 degrees to 40 degrees Trendelenburg in three seconds, was used to standardise the dependency manoeuvre. Both APG and PPG tests were performed simultaneously. Also, PPG was performed in the recommended sitting position after 10 ankle dorsi-flexion pumping manoeuvres.

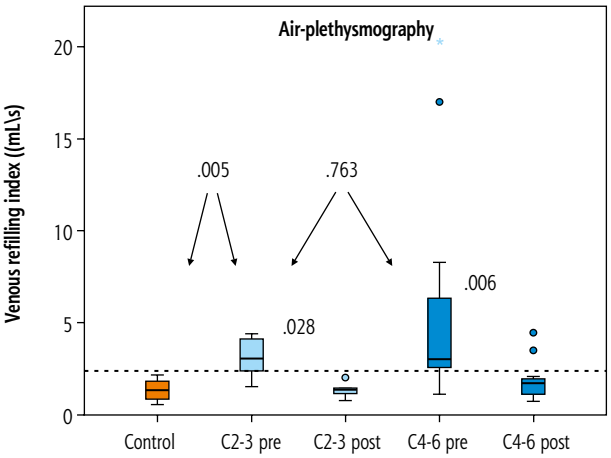

Fig. 1. Boxplots illustrating the VFI differences between healthy controls and the CVI groups pre- and post-op.

Results: Interestingly, the median (inter-quartile range) venous clinical severity score was not statistically different before (5 [4-6]) vs. after EVLA (5 [4-9]), p = 0.153, Wilcoxon. As expected, the venous filling index (VFI) of APG and the venous filling time (VFT) of PPG sitting both improved significantly: APG-VFI (pre 3 [2.4-4.4] vs. post 1.4 [1.1-1.9], p = 0.001) and PPG-VFT (pre 8 [3-21] vs. post 24 [15-30], p = 0.02). However, when patients were divided into groups C2-3 and C4-6 there was more overlap present post-treatment with PPG than with APG (Fig. 1, Fig. 2). Furthermore, significant correlations were observed only in the pre-op CVI patients when APG parameters were compared to PPG parameters (Table 1). There was none of the expected inverse PPG-APG correlations in the controls nor any significant correlations in the post-op patients.

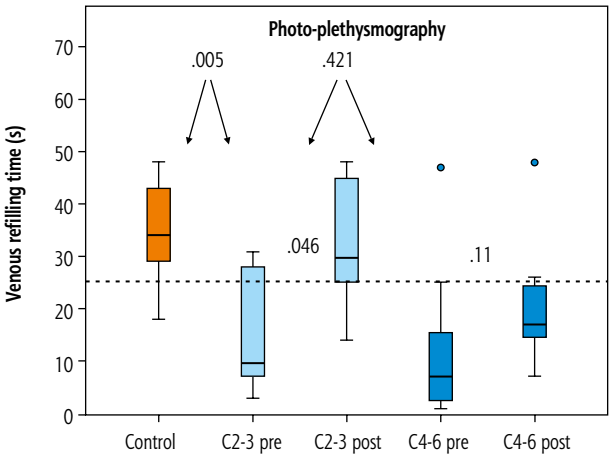

Fig. 2. Boxplots illustrating the PPG differences between healthy controls and the CVI groups pre- and post-op.

Conclusions: Both APG and PPG are responsive to intervention. However, there was more overlap with PPG, and no significant APG-PPG correlations were observed in the controls or in the post-op patients. Optical skin changes measured with PPG may indicate local microcirculatory disturbances, but they do not reflect the global volume improvement parameters measured with APG.

TWO CPG LOCI IN THE REGULATORY REGIONS OF THE *MFAP5* GENE ARE HYPOMETHYLATED IN VARICOSE VEINS

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Objectives: Our present knowledge of the molecular mechanisms underlying primary varicose vein development is still far from complete. The current study was aimed to determine, using an independent method, the methylation level (and possible reason for its change) of two CpG loci: cg06256735 and cg15815843, located in the regulatory regions of the *MFAP5* gene (-409 and +175 from the Transcription Start Site (TSS), correspondingly) in paired vein samples (varicose and

Table 1. Correlations between air-plethysmography (APG) and photo-plethysmography (PPG) in the assessment of chronic venous insufficiency (CVI). Significant correlations are displayed in bold face.

APG vs. PPG			Control legs (n = 12)		CVI legs pre (n = 17)		CVI legs post (n = 17)	
			p-value	r[f]	p-value	r	p-value	r
VFT[a]	vs.	**% pump**[c]	0.505	–0.214	**0.047**	**0.488**	0.557	–0.153
VFT	vs.	**VRT**[d] **sitting**	0.186	–0.41	**0.027**	**0.535**	0.525	0.166
VFT	vs.	**VRT on TT**[e]	0.242	0.366	**0.002**	**0.693**	0.772	–0.076
VFI[b]	vs.	**% pump**	0.06[g]	0.557	**0.031**	**–0.522**	0.754	0.082
VFI	vs.	**VRT sitting**	0.001[g]	0.813	**0.002**	**–0.688**	0.707	–0.098
VFI	vs.	**VRT on TT**	0.717	0.117	**0.003**	**–0.675**	0.267	–0.285

[a] Venous filling time; [b] Venous filling index; [c] Calf pumping performance after 10 dorsi-flexion manoeuvres sitting; [d] Venous refilling time; [e] Tilt-table; [f] Spearman rho; [g] Not an inverse correlation

non-varicose vein segments) from patients with varicose veins. This gene encodes an extracellular matrix component: microfibril-associated protein MFAP5, which, being upstream of the regulatory signalling cascade that influences such processes as "extracellular matrix organization", "cell adhesion", and "blood vessel morphogenesis", plays an important role in maintaining the vascular integrity.

Material and methods: Post-operation material of paired samples (varicose and non-varicose vein segments left after surgery, from a corresponding patient) of great saphenous veins of the lower limbs was used for this study, approved by our institutional committee, in accordance with the principles written in the Declaration of Helsinki. DNA isolated from the samples (42 in total or 21 pairs) of 21 patients who had clinical diagnosis of "primary varicose veins" of classes C2–C4 according to CEAP were taken for the analysis. Determination of the methylation level of two *MFAP5* gene loci was performed using bisulphite conversion followed by pyrosequencing. Statistical analysis was performed using Excel and STATISTICA packages.

Results: We revealed that both loci related to the *MFAP5* gene were hypomethylated in varicose veins compared to non-varicose veins (details are shown in the table below), which is consistent with our previous epigenome-wide microarray analysis. For cg15815843 (in the promoter region of *MFAP5*) in some of those samples, we also observed (on the border of significance) an elevated level of 5-hydroxymethylcytosine in varicose veins compared to non-varicose ones, which may point to an active mechanism of hypomethylation. However, the latter finding needs further confirmation.

Table 1.

Target	*p*-value	Comparison	Ratio	95% CI low	95% CI high	Pairs (patients)
cg06256735	0.00006	NV/VV	1.458	1.114	1.948	21
cg15815843	0.00006	NV/VV	1.521	1.186	1.986	21

NV – non-varicose vein; VV – varicose vein.

Conclusions: Hypomethylation of cg06256735 and cg15815843 CpG loci located in the regulatory regions of the *MFAP5* gene may explain up-regulation of its expression in varicose veins, which contributes to the pathogenesis. The work was supported by the Russian Science Foundation (Project 17-75-20223 "Investigation of the mechanisms of vein wall remodelling in varicose veins").

Table. Differences in methylation (5-methylcytosine) level of *MFAP5* gene CpG loci between varicose and non-varicose vein condition, according to the Wilcoxon-signed rank test

MOLECULAR GENETIC ANALYSIS OF FOXC2 GENE MUTATION IN VARICOSE VEIN (VV) PATIENTS OF NORTH INDIA

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Objectives: Varicose vein is a complex disease, influenced by a number of genetic and environmental factors. FOXC2 gene situated on chromosome 16q24.3 encodes a regulatory transcription factor. It is implicated in both lymphatic and vascular development.

Material and methods: To detect genetic mutation among the FOXC2 gene locus the DNA of 190 patients and families with clinically diagnosed VV was subjected to molecular genetic analysis. There were 116 males and 74 females. Purified DNA was amplified with polymerase chain reaction using three allele-specific designed primers sets.

Results: Detection of mutation FOXC2 region I was done with PCR product -413 bp of the 5' regions to +655bp of exon. Amplification of 5' UTR region I of FOXC2 gene was carried out. The amplified fragments (I, II, and III) were of sizes 607, 269, and 450 bp, respectively. One hundred and two male patients and 67 female patients showed at least one mutation in region I of the FOXC2 gene. A (-91C→G) transversion was seen in 16.84% cases and two SNPs (-41G→A) and (-41G→T was detected) in 64.21% and 52.63% cases, respectively. None of these mutations was detected in healthy control subjects. The χ^2 value revealed a significant association between type of mutation and sex ratio of varicose vein cases (df = 2, $p > 0.002$). The information about various lifestyle risk factors was correlated with the mutation present. Fisher's exact analysis revealed a significant association between the three working groups, sex ratio, and FOXC2 mutations ($p < 0.05$). The prevalence of varicose veins in patients with positive family history was 61.11%. Adjusted OR was 6.375 (95% CI: 0.7508-54.126) in men and 0.319 (95% CI: 0.0319-3.181) in women.

Conclusions: *t* indicates a significant role of genetic factors in the occurrence of varicose veins.

A LONGITUDINAL STUDY ON SYMPTOMS AND QUALITY OF LIFE IN LOWER LIMB VARICOSE VEIN PATIENTS WITH SURGICAL TREATMENT

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Objectives: To understand the change patterns of symptoms and quality of life (QoL) in lower limb varicose vein (VV) patients from pre-operation to one month after surgery, and to explore the factors affecting quality of life in VV patients.

Material and methods: A total of 109 patients (167 limbs) were investigated and followed by using the general information questionnaire, Clinical-A(E)tiological-Anatomical-Pathophysiological classification system (CEAP), Venous clinical severity score (VCSS) and Chronic Venous Insufficiency Quality of Life Questionnaire-14 (CIVIQ-14) at three time points (pre-operation, seven days after surgery, and one month after surgery).

Results: The majority of patients were C4 (37/33.9%). The VCSS scores at three time points were 6.05 ±3.78, 3.75 ±3.40, and 2.88 ±2.05. The CIVIQ scores at three time points were 63.03 ±5.54, 48.86 ±6.36, and 64.39 ±4.08. The scores of VCSS and CIVIQ seven days after surgery were significantly lower than the scores at other time points ($P < 0.05$). Liner regression analysis showed that preoperative pain and diabetes could explain the 39.0% degree of variance in quality of life before surgery. Seven days after surgery, postoperative pain and preoperative clinical classification were influencing factors of QoL and could explain the 66.6% degree of variance. VCSS and limb swelling could explain the 76.4% degree of variance in quality of life one month after surgery.

Conclusions: VV patients experienced more severe symptoms after surgery and recovered one month after surgery. Pain and VCSS were important factors affecting patients' QoL. Therefore, effective postoperative pain management could improve the QoL of VV patients.

IS DIFFERENTIAL DIAGNOSIS OF LIPOEDEMA BY MEANS OF HIGH-RESOLUTION ULTRASONOGRAPHY POSSIBLE?

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Objectives: The current German guidelines on treating lipoedema recommend the use of flat-knitted compression material and manual lymphatic drainage as well as liposuction. Differentiating lipoedema from obesity and asymptomatic lipohypertrophy frequently proves difficult. However, a reproducible and objective differential diagnosis is the foundation of an expedient and cost-effective treatment.

Material and methods: As part of a multi-centre registry study (five centres) ultrasound scans were performed between 1/2016 and 5/2017 on the legs (n = 294) of a total of 147 patients with lipoedema (n=136), lymphoedema (n=20), lipoedema with secondary lymphoedema (n = 30), lipohypertrophy (n = 42), and obesity (n = 30), as well as healthy individuals (n = 36). Measurements were performed on the thickness of

the cutis and subcutis of the lower and upper leg and on their compressibility. An analysis of the sonomorphology was also conducted.

Results: Special sonomorphological properties that allow lipoedema to be differentiated from other disease entities and from healthy individuals have yet to be consistently and conclusively identified. The compressibility of the cutis-subcutis complex is completely unspecific and does not allow for any conclusions to be drawn concerning lipoedema. It has not been possible to detect fluid retention in patients with lipoedema.

Conclusions: To date, the qualitative differentiation of the anatomical and pathomorphological features of lipoedema from those of painless lipohypertrophy, obesity, and the skin/subcutaneous tissue of healthy persons using sonographic imaging has not been possible to a satisfactory degree. Due to the large individual variation in findings and the likewise considerable differences in ultrasound scanners and their configuration, it is also currently impossible to obtain reproducible results that would enable the individual disease entities to be clearly distinguished. 2. Contrary to expectations, the compressibility of the cutis-subcutis complex is entirely non-specific. No sonographic correlate for clinical phenomena such as the mattress phenomenon could be established. 3. Although ultrasound enables accumulations of interstitial fluid to be demonstrated, it does not provide any indications of oedema aetiology. 4. Because it was not possible to demonstrate fluid accumulations in patients with "painful lipohypertrophy", the description of this disease as "lipoedema" is misleading and should be re-considered. At the present time, it must be assumed that in routine care, essentially only the medical history and clinical findings are available for confirmation of the diagnosis of lipoedema and its differential diagnosis.

THYROID DYSFUNCTION AND VENOUS INSUFFICIENCY

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Objectives: To ascertain if there is a connection between thyroid dysfunction, either hyperthyroidism or hypothyroidism, and chronic venous insufficiency

Material and methods: Records of 4540 patients who presented as outpatients to a private vein clinic in Mumbai were examined, and various parameters studied, to determine the presence or absence of thyroid dysfunction. Demographic and clinical parameters were compared among these patients. 3339 of these patients had varicose veins.

Results: Overall 2.8% of patients with varicose veins had thyroid dysfunction (0.7% in males, and 5.1% in females). The likelihood of thyroid disease was found to be 3.0-times higher in the varicose vein group. There was also a positive association with the incidence of thyroid with increasing age, with a significant increase after the age of 40 years. Furthermore, the likelihood of thyroid disease was 0.1386-times higher in females.

Discussion: The discussion centres around the reason why thyroid dysfunction, whether in hyper- or hypothyroid state, leads to changes in cardiovascular and muscle function, leading to or exacerbating chronic venous disease.

CLASS 2 COMPRESSION SLEEVES FOR FULL LEGS VERSUS STOCKINGS AFTER THERMAL ABLATION WITH PHLEBECTOMY: A RANDOMISED TRIAL

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Objectives: Compression is used after invasive treatment in patients with varicose veins, in order to reduce pain and bruising and to maintain vein occlusion after thermal or chemical ablation. Duration of compression after the procedure varies significantly. Many specialists prescribe compression for weeks after the procedure, but patients often report discomfort. This is one of the reasons for poor adherence to compression, especially if day and night compression is recommended. To make the post-procedural compression more tolerable, foot-sparing bandages were tested, proving its reliability. While sleeves for the full legs with slight compression designed for athletes are available, no such garments with class II compression are offered for venous patients yet. This study aimed to compare the effect of class II foot-sparing compression sleeves for the full leg with class II stockings regarding quality of life 30 days after thermal ablation with concomitant phlebectomy.

Material and methods: 187 patients with varicose veins and great saphenous vein incompetence were enrolled in a randomised controlled non-inferiority trial. Those who needed stab avulsion in the foot area were not included. Patients were randomised to use class II foot-sparing compression sleeves for the full leg (Ecoten, Russia) or class II stockings after intervention. Sleeves or stockings were put on immediately after intervention. Patients were instructed to use compression day and night for first seven days and then during the day only up to 30 days. The primary end-point of the study was quality of life measured by CIVIQ-20 questionnaire 30 days after intervention. Secondary end-points were pain in the leg and discomfort related to compression garment assessed by 100-mm visual analogue scale (VAS) at two, seven, 14, and 30 days.

Results: The global index score of CIVIQ-20 was 33.9 and 29.4 in the sleeves and stockings group before ($p = 0.347$) and 16.2 and 12.3 30 days after intervention ($p = 0.15$). Pain score in the operated leg was slightly higher in the sleeves group the day after intervention (2.1 vs. 1.6, $p = 0.023$). At seven, 14, and 30 days pain scores did not differ significantly (0.7 vs. 0.5, NS; 0.5 vs. 0.3, NS; and 0.1 vs. 0.1, NS, respectively). Discomfort measured by VAS was also slightly higher in a study group next day (1.9 vs. 1.4, $p = 0.06$) and after seven days (0.9 vs. 0.6, $p = 0.008$). No difference in discomfort was found between study and control groups at 14 and 30 days (0.6 vs. 0.4, NS; and 0.4 and 0.4, NS, respectively).

Conclusions: Quality of life after thermal ablation with phlebectomy improved equivalently in patients who used class II compression sleeves for full legs compared with those who used class II compression stockings. Pain and discomfort were slightly higher in the sleeve group in the first week.

A COMPARISON OF SAFETY AND EFFICACY OF VENABLOCK – CYANOACRYLATE-BASED ENDOVENOUS SYSTEM VS. ENDOVASCULAR BIRADIAL 1470-NM LASER IN THE TREATMENT OF TRUNCAL INSUFFICIENCY OF SUPERFICIAL VEINS. A 12-MONTH OUTCOMES OF THE ESVETIS OBSERVATIONAL STUDY.

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Objectives: Currently the treatment of superficial vein truncal insufficiency is based on minimally invasive endovascular methods, among them application of cyanoacrylate glue. Most recently a new generation of cyanoacrylate, the VenaBlock (VB) system, was introduced to the market. The modified formula results in low glue viscosity and its fast polymerisation, which, however, may affect the effectiveness of this method. The aim of our observational study was to assess the safety and efficacy of the VenaBlock glue system, and to compare it to the well-established endovascular treatment: near-infrared (1470 nm) laser (L) thermoablation.

Material and methods: The study involved 87 patients, alternately allocated to VB ($n = 41$) or L ($n = 46$) group. The assessment comprised selected morphometric parameters (before and 12 months after treatment), duration of procedure, pain during and after the procedure, occurrence of adverse events, changes in patient's quality of life score, as well as effectiveness of vein closure.

Results: The VB procedure duration was significantly shorter than laser treatment (7.1 ±4.6 vs. 17.0 ±4.2 minutes); pain/discomfort during the procedure did not differ statistically. However, this difference reached statistical significance within one week of the treatment (4.3 ±2.4 vs. 2.9 ±2.4, respectively). No serious adverse events were recorded in either group, nor any significant difference between groups in other adverse reactions. The 12-month follow-up revealed 85% occlusion efficiency in the VB group vs. 97.8% in the L group. When analysed with regard to initial vein diameter, a higher risk of their recanalisation was associated with the use of VB in larger veins.

Conclusions: The VenaBlock glue system is a safe and extremely quick procedure; however, its effectiveness seems to be limited in larger vessels.

FIRST 12-MONTH RESULTS OF MECHANOCHEMICAL ABLATION USING THE FLEBOGRIF SYSTEM IN RUSSIA AND BELARUS

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Objectives: Mechanochemical ablation using Flebogrif system is a new minimally invasive alternative to thermal ablation for the treatment of superficial vein insufficiency. The Flebogrif system combines mechanical endothelial damage with the help of nonrotating claws and chemical endothelial damage with infusion of a foam sclerosant. Nevertheless, mechanochemistry is not such a widespread technique in clinical practice in Russia and Belarus. The aim of this study was to evaluate the one-year results of mechanochemical endovenous ablation using the Flebogrif system.

Material and methods: Our study included 165 patients: 131 GSV and 34 SSV insufficiency. 69% were women and 31% were men. Diameters of the saphenous veins treated were 6 -12 mm. Patients were reviewed at one week and at one, three, six, and 12 months post-procedure and underwent duplex ultrasound. The study included patients who underwent all control examinations. Presently all patients completed six months of follow-up, and 68 patients (41%) finished follow-up. Additional trunk sclerotherapy sessions have not been performed. Anticoagulant therapy was not used.

Results: Initial technical success was 100%. One week post-procedure, all treated veins were occluded. After one month post-procedure 3% had a partial recanalisation. At three months and six months of follow-up the occlusion rate was 96% and 93%, respectively. Duplex ultrasound at one year showed 92% occluded veins. There were no major adverse events and no nerve injury. The most frequent complication after the procedure was transient superficial thrombophlebitis of the treated vein (17%), which did not required any analgesic treatment. Hyperpigmentation in the projection of the obliterated vein was formed at the end of first week of dynamic observation in 29 patients (17.6%). Thrombophlebitis resolved in one month, and hyperpigmentation resolved in six months for all the patients.

Conclusions: This research showed that mechanochemical ablation using the Flebogrif system is a safe method for ablation of varicose veins. This technique shows good results of one-year follow-up and an occlusion rate of 92%. Features of the organisation of medical care limit the use of technology in clinical practice.

WHAT IF ONLY EVLA? FIVE YEARS OF FOLLOW-UP

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Objectives: To demonstrate one-year outcomes after endovenous laser ablation (EVLA) of incompetent saphenous veins without phlebectomy in the same session with the use of a 1470-nm diode laser and radial 1ring/2ring fibres.

Material and methods: Incompetent saphenous veins in 177 patients (177 limbs; Clinical/A(E)tiological/Anatomical/Pathophysiological classifications of C2–C6). the study group included 123 women and 54 men. The age of the patients was 29 to 84 years. Methods: All patients were treated by EVLA with radial 1ring/2ring fibres, 1470-nm diode laser, LEED no greater than 80 J/cm, and laser power of 8–10 W. Patients were evaluated clinically and using duplex ultrasonography at 10 days and at one, three, six, and 12 months after EVLA to assess technical and clinical success, the incidence of complications, and the need for further treatment (phlebectomy/sclerotherapy).

Results: In the 177 limbs, the technical success rate was 98.9% (175 limbs/two recanalisations). By the third month after the operation, 45.6% of patients noted the absence of the need to remove the side-branches. Only 7.3% of patients underwent a miniphlebectomy during the first year of follow-up. Sclerotherapy in the second session was performed for 36,7% of patients. Healed the varicose ulcers in the 92% (without shave operation). There were no intra-operative complications. No major complications occurred, although bruising (3.5%), thrombophlebitis of the side-branches (3.5%), and non-permanent paraesthesia (4%) were observed.

Conclusions: Follow-up at one year shows that EVLA with the use of a 1470-nm diode laser and radial 1ring/2ring fibres without phlebectomy in the same session is an effective and safe procedure with excellent technical success rates in the treatment of varicose disease. The optimal time to decide whether to perform additional procedures (phlebectomy/sclerotherapy) is 3-6 months after EVLA.

THERMAL ENDOVENOUS ABLATION IN THE TREATMENT OF PATIENTS WITH CONGENITAL MALFORMATION OF THE DEEP VENOUS SYSTEM OF THE LOWER EXTREMITIES

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Objectives: Venous forms of congenital vascular malformations (VF CVM) range from 49 to 80% of VF CVM. As studies show, the pronounced pathology of the deep venous system is observed in every three patients among the venous forms of VF CVM. Aim of the study. To determine the possibility of using endovenous laser coagulation in the treatment of anomalies of the deep venous system of the lower extremities.

Material and methods: In the period from 2015 to 2018, 51 patients were under the supervision, with venous forms of VF CVM with a pathology of the deep venous system, of whom 24 (47%) men and 27 (53%) women. The age of patients varied from 8 to 43 years. The average age was 27 ± 4 years. The main complaints of the patients were the presence of pain, a feeling of pain in the limbs, swelling, and the presence of varicose veins. Examination methods: colour duplex angioscanning, phlebography, and arteriography of the lower extremities (if indicated). The truncular (T) form of venous VF CVM was detected in 17 (33.3%) patients, the extratruncular (ET) form – in 21 (41.2%) patients, and the T and ET forms – in 13 (25.5%) patients. According to colour duplex angioscanning, "sources" and confluence points (to the iliac veins) with multiple connections to the hypoplastic deep venous system were determined. In the overwhelming number of patients, the defeat of the deep venous system was limited only by segmental hypoplasia of the deep venous system in the area of the presence of VF CVM.

Results: In the presence of T forms, according to colour duplex angioscanning, the sources of reflux were determined, as well as the conditions for the possible closure of the venous trunks using endovenous laser coagulation (ELC). In case of ET forms, X-ray endovascular obliteration (EO) of microfistulae was used in 11 (33%) patients to reduce arterial inflow, then ELC was performed. In the case of the presence of combined forms of VSM at stage 1, EO of microfistulae was performed, then ELC. The ELC technique suggested the closure of the "marginal" vein and anomalous veins of the deep venous system. The method involved the segmental implementation of ELC (in stages) or throughout, depending on the location and extent of the lesion. Tumescent anaesthesia was used. In most cases, ELC was supplemented with compression sclerotherapy. All patients were operated in 2-4 stages. Terms between stages lasted for 2-3 months. Given the proximity of the arteries and nerve trunks, as well as to prevent fasciocompression syndrome, it is necessary to correctly perform tumescent anaesthesia on the lower leg. The obligatory aspects of the operation were constant contact between the patient and the doctor, and control of pulsation on the peripheral arteries of the limb.

Conclusions: The proposed approaches led to satisfactory results in all operated patients. The complete closure of ablated veins was noted.

INDICATION CRITERIA AND CONTRAINDICATIONS FOR CYANOACRYLATE EMBOLISATION OF VARICOSE VEINS

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The authors give an overview of the indication criteria for the cyanoacrylate embolisation of varicose veins, which are presented in the literature supplemented by their own experience. Indications are basically common to all endovenous methods. The advantages are non-tumescence performance, postoperative course without the need for compression, and immediate haemodynamic effect. When compared to radiofrequency and laser ablation, the results are fully comparable. Patients emphasise significantly greater CAE comfort both in performance and in follow-up care.

MID-TERM RESULTS OF THE ASVAL PROCEDURE IN PATIENTS WITH PRIMARY VARICOSE VEINS

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Objectives: Ambulatory selective varicose vein ablation under local anaesthesia (ASVAL) is a vein-sparing technique to restore flow in truncal veins in patients with primary varicose veins. Short-term results of the procedure are encouraging with more than two thirds of great saphenous veins (GSV) returning to a normal condition within one year of removal of their varicose branches. Until now just one team of researchers published mid- and long-term term results of ASVAL (P. Pittaluga and S. Chastanet, 2016). This study is aimed to evaluate our mid-term results in a cohort of patients operated by ASVAL.

Material and methods: We operated on 129 limbs in 110 patients (80 women, 30 men) with mean age of 45 years (min 17, max 75) with GSV incompetence and varicose veins. There were 107 (83%) C2 limbs, 18 (14%) –C3, and 4 (3%) – C4. All the interventions had been performed by ASVAL procedure with preservation of incompetent GSV trunk under local anaesthesia with lidocaine 0.05%. Patients were examined both clinically and by duplex ultrasound every year after operation. The data on varicose vein recurrence, persistence of great saphenous veins reflux, and the need for surgical re-intervention were collected. Kaplan-Meier analyses for the absence of recurrent varicose veins and GSV reflux were performed.

Results: The mean follow-up duration was 24 months (from 12 to 60 months). According to Kaplan-Meier analysis, 85%, 77%, 72%, 62%, and 62% legs were free from recurrent varicose veins at one-, two-, three-, four-, and five-year follow-up, respectively. Re-interventions were performed only in three legs. In all three cases thermal ablation with concomitant phlebectomy was conducted. The absence of GSV reflux was shown by Kaplan-Meier analysis in 68%, 63%, 57%, 50%, and 48% one, two, three, four, and five years after the procedure.

Conclusions: GSV reflux after ASVAL procedure disappears in more than half of cases at mid-term follow-up. Persistence of reflux does not lead to a substantial rate of re-intervention. Mid-term results of phlebectomy with preservation of incompetent GSV trunk are satisfactory in terms of recurrence of varicose veins.

ONE-STAGE REMOVAL OF POPLITEAL VEIN THROMBOSIS WITH PHARMACOMECHANICAL THROMBOLYSIS TO IMPROVE CLINICAL EFFICACY OF WHOLE-LOWER-LIMB ACUTE DEEP VEIN THROMBOSIS: A RETROSPECTIVE COHORT STUDY WITH THREE-YEAR FOLLOW-UP

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Objectives: To investigate the clinical efficacy of one-stage removal of popliteal vein thrombosis with pharmacomechanical thrombolysis (PMT) in the treatment of whole-lower-limb acute deep vein thrombosis (DVT).

Material and methods: From March 2016 to March 2018, a consecutive cohort of patients with whole-lower-limb acute DVT admitted in our hospital were retrospectively analysed. Thirty-one patients were enrolled, and all patients were treated with PMT by Angiojet. The data of puncture approach, aspiration volume, hospitalisation days, thrombus clearance rate, complications, and 12-month primary patency rate were analysed. The incidence of post-thrombotic syndrome (PTS) and moderate-to-severe PTS were counted by Villalta score.

Results: All patients underwent one-stage removal of popliteal vein thrombosis with PMT successfully. Among the 31 patients, 26 cases were performed by contralateral common femoral vein approach, of which 24 cases were successful, the success rate was 92.3% (24/26), and the other five cases were performed by ipsilateral calf deep vein approach. The average aspiration volume was 301.8 ±73.6 ml. After PMT, seven cases combined with catheter-directed thrombolysis, 26 cases with PTA, and 14 cases with stenting. The average number of hospitalisation days was 7.6 ±1.8. The thrombus clearance rate was grade II (50-99%) in 16 cases and grade III (100%) in 15 cases. Haemoglobinuria was found in eight cases, haemolytic jaundice in two cases, and sinus bradycardia in one case. No bleeding-related complications and other serious complications were found. Thirty patients were followed up, and the average follow-up time was 19.7 ±8.5 months. The 12-month primary patency rate was 83.3%. Development of PTS was found in five cases, including moderate-to-severe PTS in one case. The incidence of PTS was 83.3%, and the incidence of moderate-to-severe PTS was 3.3%.

Conclusions: One-stage removal of popliteal vein thrombosis with PMT can improve the clinical efficacy of whole-lower-limb acute deep vein thrombosis and reduce the incidence of PTS.

MANAGEMENT OF TRAUMATIC INJURIES OF POPLITEAL VEIN IN A HIGH-VOLUME VASCULAR SURGERY CENTRE IN IRAN

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Objectives: We aimed to assess the outcome of patients with concomitant injuries to popliteal artery and vein in a high-volume vascular surgery centre in Iran. Ligation, venorrhaphy, and venous bypass are the three main techniques of management of popliteal vein injury. We studied the incidence of each type of treatment. Traumatic injury to the popliteal vein is an uncommon condition, and its management is of potential clinical concern.

Material and methods: In a retrospective study, we assessed the incidence of popliteal vein injury from January 2010 to December 2017 in Shohada-Tajrish Medical Centre, Shahid Beheshti University of Medical Sciences, Tehran, Iran. The type of treatment and background characteristics were evaluated. Outcome of patients was studied, and the rates of amputation, pulmonary embolism, and 30-day mortality were presented.

Results: A total of 22 patients had popliteal vein injury during eight years in our centre. All patients had concomitant popliteal artery injury. The mean age of patients was 28.1 ±8.8 years. Twenty-one patients (95.5%) were male, and one patient (4.5%) was female. Twelve patients (54.5%) had left popliteal vein injury, and 10 patients (45.5%) had right side injury. Ligation of one vein, venorrhaphy, venous bypass, and ligation of branches were used in seven (31.8%), five (22.7%), nine (40.9%), and one (4.5%) patient/s, respectively. Fasciotomy was conducted in 20 patients (90.9%). Below-knee amputation (BKA) was conducted in four patients (18.2%). One mortality occurred (4.5%). Five patients (22.7%) developed pulmonary oedema (PO). Time of patients' referral to vascular surgery centre, trauma type, shock at presentation, concomitant nerve injury, fracture type, and presence of associated injuries were compared in patients with and without BKA and in patients with and without PE. BKA

and PE were not predicted by these variables ($p > 0.05$). Table 1 illustrates the frequencies of background characteristics in study patients.

Conclusions: Venous repair in traumatic injuries of the popliteal vein is of potential clinical concern. Venous ligation in cases of a single vein injury is safe. Venorrhaphy or venous bypass are two procedures of reconstruction that should be considered in potential venous injuries. Four-compartment fasciotomy of the calf is recommended in cases of concomitant venous and arterial injuries of the popliteal fossa.

INFRACLAVICULAR SINGLE-INCISION APPROACH FOR MANAGEMENT OF NON-THROMBOTIC VENOUS THORACIC OUTLET SYNDROME

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Objectives: Obstruction of the outflow of upper extremity axillary and/or subclavian veins is usually reported as a sequel of deep vein thrombosis, i.e. Paget-Schroetter syndrome. However, it is also increasingly recognised in patients presenting with intermittent or persistent upper extremity heaviness, cyanosis, swelling, and/or oedema without any thrombotic events, i.e. as non-thrombotic venous thoracic outlet syndrome (NT-VTOS). Venous stenting is the accepted solution for similar venous outflow obstructing lesions in the lower limbs, but the case might not be the same in the upper extremity. The purpose of this study was to describe the clinical characteristics as well as the diagnostic approach for patients presenting with NT-VTOS and to determine the outcomes of single incision infraclavicular approach for management.

Material and methods: Twenty patients with NT-VTOS during the period between 2013 and 2018 presented most commonly with intermittent limb pain, heaviness, and swelling on exertion. Finding persistent swelling during examination was seen in eight cases only. Ultrasound duplex scan (with flow volume and velocity measurements in both neutral and hyperabducted positions) and direct CT Venography (in hyperabducted position) were used to establish diagnosis, exclude previous thrombosis, and localise site of attenuation of central veins. Three distinct venous compression sites could be identified: subclavian vein at the costoclavicular junction (CCJ) and/or scalene triangle (13 cases *proximal type*); axillary vein at the pectoralis minor (PM) level (five cases, distal type); and dual compression at both CCJ and PM (two cases, dual type). Cervical rib could be detected in three cases, and while 10 patients had associated symptoms of neurogenic TOS, only five were documented by nerve conduction studies. Only 10 patients agreed to have operative intervention in the form of surgical decompression guided by intraoperative venography.

Results: Proximal-type (five patients) was treated by anterior first rib resection (AFRR) via medial infraclavicular incision; distal-type (four patients) by pectoralis minor release (PMR) via lateral infraclavicular incision; and dual type (one patient) was treated by combined AFRR and PMR via long infraclavicular incision. Recovery was uneventful in all cases and patients were discharged the next day on NSAIDs for one week. Patients reported full relief of symptoms after regaining their full activity, except one patient following AFRR, who had only partial improvement with persistent pitting oedema. Re-investigating this patient, a missed PM compression was found, and PMR was done after one month resulting in complete relief. Patients having associated neurogenic symptoms reported complete relief also after treatment. Two patients had postoperative non-painful lateral neck swelling causing disfigurement following AFRR, which appeared to be retracted scalene muscle after detachment from the first rib.

Conclusions: NT-VTOS should be suspected in patients with upper extremity swelling (intermittent or persistent) without evidence of thrombosis. Investigating patients in the hyperabducted arm position by duplex or CTV can usually establish diagnosis and localise the site of lesion. An infraclavicular approach for AFRR, PMR, or both offers a simple straightforward approach for treating all venous outflow obstructing lesions with excellent short- and mid-term results.

LATE RESULTS OF VALVULOPLASTY FOR CHRONIC VENOUS INSUFFICIENCY

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Objectives: The late results of valvuloplasty for chronic venous in sufficiency (CVI) are not clear. Therefore, we investigated the late results of valvuloplasty by ultrasound examination.

Material and methods: Valvuloplasty with additional procedures (high ligation and stripping of saphenous vein etc.) was performed in 75 limbs of 68 patients with CVI in our centre between 1998 and 2015. The subjects comprised 24 limbs of 27 patients who underwent ultrasound examination during follow-up. The male-to-female ratio was 9:15. Their mean age was 62.7 years (55-73). The indication of valvuloplasty was Kistner grade > 3 in descending venography and CEAP > 3 in clinical manifestation. The target valve of valvuloplasty was the highest valve of the superficial femoral vein. The valvuloplasty was performed by internal method in 17 limbs and by external method in 10 limbs. Internal method was plication of valve cusps at the bilateral commissures. Eight limbs in external method were plication of commissures and two limbs were wrapping of valve sinus. The reflux of the repaired valve was examined by ultrasound examination for three recent years.

Results: Five limbs of internal method showed reflux of repaired valve (more than 10 years for three limbs, 70 months for two limbs). Two limbs of external method showed reflux of repaired valve (more than 10 years for one limb, 70 months for one limb). The maximum period free of reflux was 177 months for the internal method and 118 months for the external method. The vein reflux with non-repaired valve was found in 16 limbs (59%). The reflux was found in the common femoral vein of four limbs, popliteal vein of 12 limbs, SFJ of four limbs, and SPJ of six limbs. Five-year reflux free rate was 76.5% in the internal method and 80% in the external method.

Conclusions: Valvuloplasty of deep veins for CVI showed 76.5%-80% for five-year reflux-free rate at a mean follow-up time of 97.5 months. Therefore, the late results of valvuloplasty were acceptable.

CRITERIA FOR INVESTIGATING PATIENTS WITH VENOUS INSUFFICIENCY FOR DEEP VENOUS OBSTRUCTION

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Objectives: Venous hypertension develops in patients with chronic venous disease (CVD) due to reflux and/or obstruction affecting lower limb superficial veins, deep veins, or both. Duplex ultrasonography (DUS) is usually the first-line investigation and can efficiently diagnose most lower-limb venous pathologies. However, patients with proximal deep venous pathology usually require more advanced investigation tools, e.g. IVUS, CTV, or MRV, to diagnose outflow obstructing lesions, which are both being more recognised nowadays and their clinical importance increasingly emphasised. Unfortunately, there is no clear consensus on which patients should be investigated for possible outflow obstruction.

Material and methods: We retrospectively reviewed our data of 875 patients with CVD (CEAP C2-6), who were investigated since 2008 for venous outflow obstruction using direct CT venography (with direct leg vein contrast injection). We identified clinical and duplex findings during initial examination, which positively correlated with finding a deep venous obstructing lesion in CTV images. We aimed from this study to extrapolate criteria that strongly suggest the presence of a deep venous obstructing lesion that warrants the use of more advanced investigations in patients with CVD.

Results: Clinical criteria: 1) advanced CVD (CEAP C4-6); 2) history of deep vein thrombosis; 3) venous claudication (bursting pain on walking); 4) bizarre distribution of varicose veins; 5) unilateral huge varicose veins (with contralateral free leg); 6) unilateral increased girth of thigh and leg; 7) progression or worsening manifestations after superficial reflux ablation or stripping; and 8) associated pelvic congestion man-

ifestations and vulvar varicosities. Duplex criteria: 1) monophasic CFV wave pattern; 2) asymmetric right vs. left CFV flow analysis; 3) deep venous reflux in multiple segments; 4) post-thrombotic changes (wall fibrosis, luminal narrowing, residual thrombus); and 5) direct visualization of compressed iliac vein (< 6 mm diameter)

Conclusions: Deep venous obstructing lesions are increasingly being diagnosed in patients with CVD. A high clinical suspicion together with the choice of the suitable imaging modality is mandatory to detect significant lesions that require treatment. The proposed selection criteria can both avoid missing patients with underlying significant lesions, and at the same time avoid unnecessarily investigating patients with low probability of finding any venous outflow obstructing pathology.

POPLITEAL VEIN EXTERNAL BANDING AT THE VALVE-FREE SEGMENT TO TREAT SEVERE CHRONIC VENOUS INSUFFICIENCY

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Objectives: Axial deep venous reflux causes skin changes or ulcers in patients with chronic venous insufficiency (CVI). The study aimed to review the results of correcting axial deep venous reflux using the novel valve-free popliteal vein external banding (PVEB) technique in patients with severe CVI.

Material and methods: We retrospectively reviewed 1252 patients (1252 limbs) who underwent PVEB for treatment of severe CVI between 2000 and 2015. The number and position of popliteal vein valves (PVVs) and gastrocnemius vein entries were analysed. Preprocedural and postprocedural intraluminal pressure and other haemodynamic parameters were measured and compared. Synchronous skin grafting was used for large ulcers. The healing time and ulcer and symptom recurrence rate were analysed. Long-term Venous Clinical Severity Score was compared.

Results: One pair of PVV leaflets, gastrocnemius vein entries proximal to the PVV, and PVV located in the distal-third popliteal vein segment were confirmed in 87.38% of cases in the venographic study. A total of 1252 patients underwent PVEB, and 1041 patients were followed up (mean follow-up, 55.12 months; range, 9-183 months). In the short-term, limb swelling and pain were relieved in 1187 patients (94.81%) without use of compression therapy. The reflux time and reflux volume were significantly reduced ($p < 0.001$). All the ulcers were healed in an average of 18 days (95% confidence interval, 16.68-19.32). In the long-term, the ulcer recurrence rate was 3.63%. The Venous Clinical Severity Score was significantly reduced ($p < 0.001$).

Conclusions: PVEB, which neither opens the vein wall nor relies on the existing vein valves, can promote venous return, improve haemodynamic status, and heal venous ulcer in < 2 months, with low complication and symptom recurrence rates.

CENTRAL VENOUS INTERVENTIONS IN PATIENTS WITH CHRONIC RENAL FAILURE – RESULTS AND FOLLOW-UP IN 40 PATIENTS

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Objectives: To analyse the effectiveness of central venous interventions as the primary treatment for central venous obstruction in patients undergoing haemodialysis.

Material and methods: Forty-two patients presented with symptomatic shunt dysfunction and arm swelling due to central venous obstruction. Technical success, complication, and patency rates were evaluated.

Results: Technical success to cross the lesion was achieved in 90%. Fifteen patients underwent plain balloon angioplasty, and most of them had a clinical recurrence within 3-6 months. Stent deployment was successful in all patients who we primarily chose to stent. Early re-thrombosis (within one week) was not noted in any patient. Most of the failures were from right-sided obstructions. The three-, six-, and 12-month primary patency rates were 90%, 80%, and 52%, respectively.

Conclusions: In the treatment of central venous obstruction, stent placement shows excellent technical results and helps preserve vascular access for a substantial period. Multiple repeat interventions are, however, frequently required, to maintain patency. Right-sided obstructions are more difficult to treat than the left ones.

DEEP VEIN THROMBOSIS PRESENT THINKING, TECHNIQUES OVER THE LAST DECADE

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Objectives: Deep vein thrombosis (DVT) is recognised clinically by painful oedema of the leg, tender calf, thigh, and iliac fossa, and tense superficial veins. Vascular ultrasonography confirms the diagnosis. Untreated DVT may result in pulmonary embolism (PE), pulmonary hypertension or post-thrombotic syndrome. Immobility, surgery, tumour, pregnancy, certain medicines, protein abnormality, and air travel are the assessed risk factors. Commonly practiced treatment is heparin therapy. Surgery is uncommon. In catheter-directed thrombolysis a tissue plasminogen activator (TPA) (urokinase, r-tpa, or streptokinase) is directly delivered in the thrombus, and the most effective clot lysis is achieved.

Material and methods: A retrospective analysis of 800 CASES OF DVT treated with urokinase was done. This included 457 males and 343 females between the age of 18 and 80 years, with duration of symptoms from one week to four months. USG-guided puncture of popliteal or PTV was done with surgical exposure of PTV in selected cases to place the sheath. A multi-hole catheter was fixed in the thrombus, and thrombolysis was done with urokinase with 250,000 units/hr. Check fluoroscopy was done at 12 hourly intervals and the catheter repositioned. Adjuvant heparin was given. The procedure was terminated at complete resolution or a maximum of 1 million units' infusion. Post-procedural oral anticoagulant was given with INR set at 2.50

Results: Complete resolution – 160 cases, partial thrombus resolution – 168 cases, balloon venoplasty – 504 cases, no. of stents deployed – 24, no result – 4. Follow-up results: post-thrombotic syndrome – 14, secondary varicose veins – 09.

Conclusions: TPA delivered intra-thrombus gives optimum results in DVT, preserves valves, and prevents post-thrombotic syndrome.

EFFICACY OF VARIOUS EMBOLISATION METHODS FOR THE TREATMENT OF PELVIC CONGESTION SYNDROME: THREE-YEARS OF FOLLOW-UP

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Objectives: Pelvic vein embolisation is the method of choice for the treatment of pelvic varicose veins and, caused by them, pelvic congestion syndrome. Different embolic materials (metallic coils, occluding devices, sclerosing agents, glue, etc.) or their combinations are used during this procedure. Unfortunately, there is not strong evidence of which embolic agent is most effective in the long-term. The aim of this work was to compare the efficacy of the most usable embolisation methods of pelvic veins (coil embolisation alone, sclerotherapy alone, or its combination ["Sandwich" technique]) with three years of follow-up.

Material and methods: A retrospective study included data of 174 patients with "primary" reflux in gonadal and internal iliac veins (patients with compression syndromes were excluded from the study) at which, after the procedure, significant clinical improvement was noted (pain reduction according to VAS). In all cases we used pushable metallic fibred coils (MReye®, Cook Medical, Denmark) and polidocanol foam (Aethoxysklerol®, Kreussler Pharma, Germany), Technical success was defined as the absence of venous reflux at post-embolisation venography. At the end of the follow-up period all patients reas-

sessed to detect clinical changes and, also, TVUS was done. No significant complications related with embolic material (migration, allergy) were observed.

Results: According to the used embolisation methods, patients were distributed in three groups: coil embolisation alone (n = 54), sclerotherapy alone (n = 49), and "sandwich technique" – coil + sclerosing agent (n = 71). In all groups pain reduction was significant: mean rate of VAS was 7.54 before embolisation and 2.09 after the procedure. At the end of the follow-up period in the first and second groups the VAS rate was significantly increased (3.81 and 4.48, respectively). In comparison, VAS rate changes in the third ("sandwich" technique) group was insignificant at 2.31.

Conclusions: Complex use of coils and sclerosing foam ("sandwich" technique) shows significantly better results in the medium-term (three years) after pelvic vein embolisation in comparison with coil embolisation or sclerotherapy alone.

INTEGRAL TREATMENT OF PELVIC VARICOSE VEINS AND EXTRAPELVIC LEAKS; INITIAL RESULTS

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Objectives: To perform integral treatment of pelvic varicose veins, as well as those of the vulva, groin, and lower limbs, generated by pelvic leak points. The initial results are shown below.

Material and methods: 30 patients presenting with pelvic and extrapelvic varicose veins were treated between November 2017 and January 2018. Out of the 30, 29 were women and one was a man. The average age was 41.2 years (19 to 62). In the case of three patients, the condition was associated with nutcracker syndrome (NCS); in another three, with May-Thurner syndrome (MTS), and in another one, with post-thrombosis syndrome (PTS). Twenty-three cases presented with pelvic varicose veins due to insufficiency within the gonadal veins and tributaries of the hypogastric veins (without associated compressive pathology). Seventy-three veins (in 30 patients) were embolised with coils and polidocanol (2%). 70% corresponded to gonadal veins, primarily on the left side. 20% corresponded with pudendal veins, mainly on the right side, 8% to the lower gluteal or ischiatic veins with a significant predominance of the right side, and 2% corresponded to obturator veins. Ten patients (33.3%) were treated for both gonadal veins. Monitoring was done via transvaginal US and duplex scan in order to evaluate the occlusion rate of the treated veins 15 days after treatment and then one, three, six, and 12 months after treatment. Treatments for varicose veins of the vulva, groin, and lower limbs were given after the first month, evaluating the leak points and their secondary varicose veins with Duplex scan. Polidocanol foam was used (2%) for varicose veins depending on the inguinal, pudendal, or gluteal leak points and 1% for veins around the vulva. In some cases (three of them), microphlebectomies were necessary to complete the treatment.

Results: Technical success was achieved in 100% of the cases, with a 100% occlusion rate of gonadal veins treated with Doppler USG; and either a decrease on the quantity and size, or the complete disappearance of pelvic varicose veins on the EcoTV in 95% of the cases. Dyspareunia and pelvic pain disappeared or decreased in 95% of the cases during the follow-up time (14 months-1 month). Varicose veins of the vulva, groin, and lower extremities disappeared in 85% of the treated cases, having used direct complementary therapies on varicose veins of the vulva, buttocks, perineum, or lower limbs in 27 of the embolised cases. Complications comprised three cases of post-implantation syndrome, which only required nonsteroidal anti-inflammatories as treatment; and two intraprocedural vein lesions that had no consequences and did not interfere with the fulfilment of the procedure. There was one case of intraprocedural coil migration (one coil). It was recovered endovascularly without further complications.

Conclusions: Integral treatment of pelvic varicose veins and their extrapelvic leaks shows good results, regarding technical success and short-term clinical results, and it presents few complications. A longer follow-up time is required for long-term evaluation.

ENDOVASCULAR TREATMENT OF NUTCRACKER SYNDROME: OUR INITIAL EXPERIENCE

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Objectives: To convey the initial experience of our work, with the support of Spanish experts and following their protocol on endovascular treatment for nutcracker syndrome.

Material and methods: According to our protocol, in patients subjected to diagnostic phlebography due to a clinical, echographic, and/or tomographic suspicion of post-thrombotic syndrome (PTS), congestion pelvic syndrome (CPS), May-Thurner syndrome (MTS), or nutcracker syndrome (NCS), we systematically studied the left renal vein, both gonadal veins, both hypogastric veins, and primitive iliac veins. Between December 2017 and December 2018, 74 diagnostic phlebographies were made and images that were compatible with NCS were detected in nine cases. In order to determine whether an image was compatible with NCS, we looked for a lack of contrast fill owing to sinequias, developed collateral circulation, and flow inversion. Additionally, endoluminal pressures were measured in order to evaluate tension gradients. IVUS was not utilised. Of the nine cases, only four presented clinical pictures of NCS with severe pain on the left flank and intermittent or permanent haematuria. Out of the five remaining cases, three presented pelvic varicose veins with a clinical picture of CPS. Consequently, Left Gonadal Vein embolisation was indicated. In one of the cases, one circumaortic left renal vein was detected. No therapy was indicated. There was another asymptomatic case for NCS, for which medical treatment was indicated. The four cases that had presented images that were compatible with NCS, flank pain, and haematuria were treated endovascularly – one man (19 years old) and three women (27, 39, and 44 years old). All cases were treated with stents designed for veins (two Zilver Vena Cook and two Vici by Veniti/Boston Scientific). Three cases coexisted with insufficient left gonadal veins. They were embolised with 0.035 Interlock coils (Boston Scientific). Among this last group was the case of a man whose left spermatic vein was embolised. The approaches were double in all cases, using the left jugular vein and left femoral vein. The stents were placed through the jugular access, except in the case of a patient whose left renal vein was retroaortic (posterior NCS). The stent was placed through the femoral access. A CT scan was indicated for follow-up three months later, as well as a duplex scan after six months.

Results: In all four cases, the procedure was successful. The haematuria subsided in all of them. The pain disappeared completely in three patients and partially subsided in the other one, decreasing in the VAS from 9 to 3. We did not face any stent or coil migrations in the embolised cases. In one case, we dealt with a suboptimal stent deployment that took place 1 cm away from the ostium of the left renal vein, in the inferior vena cava, casually, in the patient whose pain had not subsided entirely (9 to 3). In this case, we remained expectant, given the remission of haematuria and the partial decrease in the pain level. In three of the four cases we had post-implant syndrome.

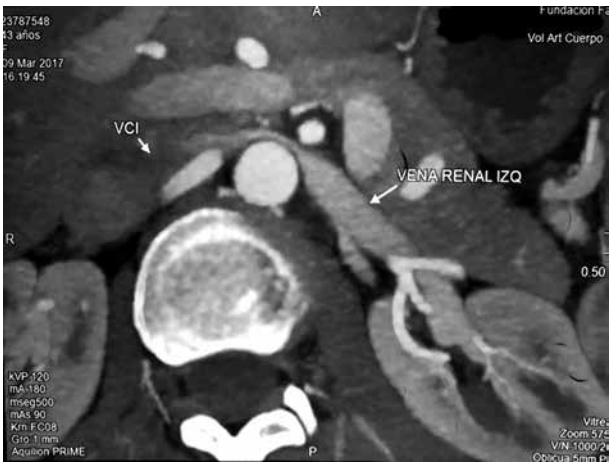

Fig. 1. CT of NCS

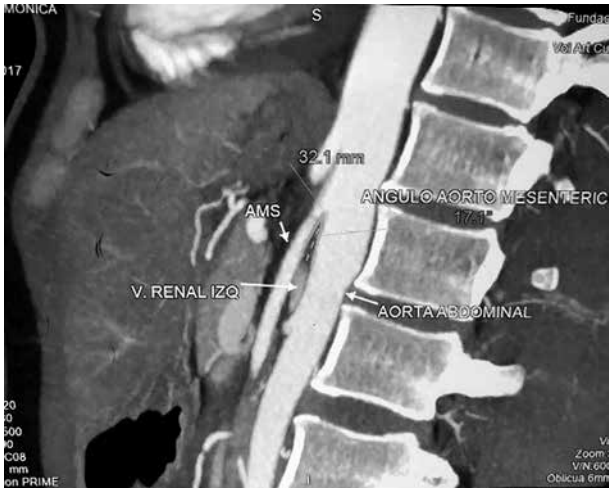

Fig. 2. CT of NCS

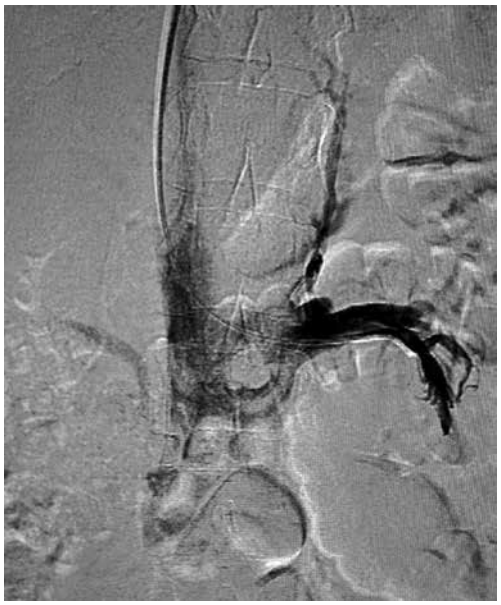

Fig. 3. Double left renal vein

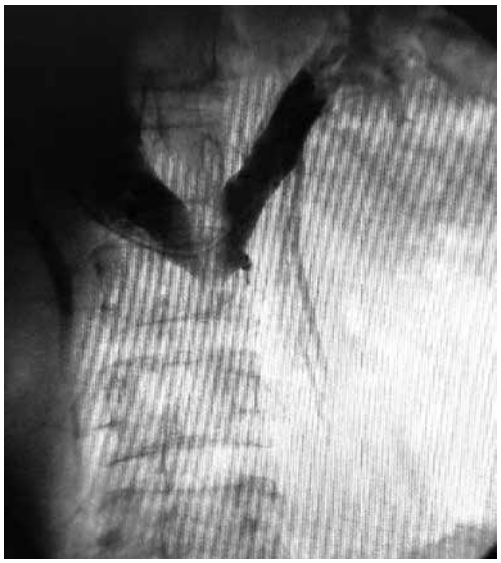

Fig. 4. Retro-aortic left renal vein

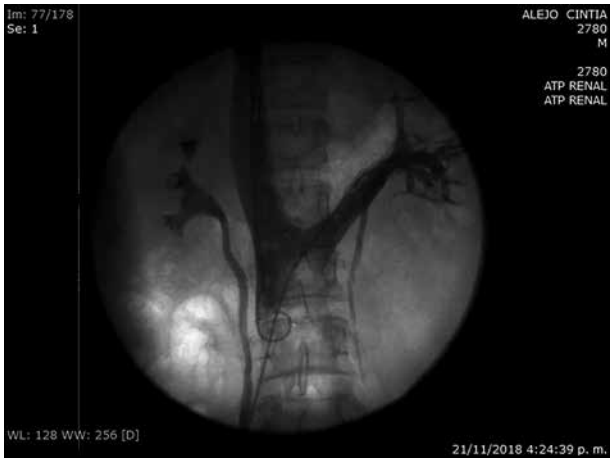

Fig. 5. Retro-aortic left renal vein, treatment

Conclusions: The procedure appears to be safe, with a low rate of complications, if the appropriate technical precautions are taken into account. Short-term follow-ups show a satisfactory success rate. However, long-term results are yet to be evaluated.

INITIAL RESULTS OF A FIRST-IN-MAN CLINICAL TRIAL FOR ENDOVENOUS DEEP VENOUS VALVE FORMATION TO TREAT CHRONIC VENOUS INSUFFICIENCY

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Objectives: Chronic venous insufficiency (CVI) due to superficial and deep venous reflux (DVR) or venous obstruction is widespread and associated with significant morbidity for patients, as well as economic burden. DVR correlates with increased symptoms. Historically, therapeutic approaches to DVR involved difficult and morbid surgical procedures or unsuccessful attempts to implant valves. The study objective was to assess the safety and effectiveness of endovenous formation of autogenous deep vein valves in patients with DVR and significant associated CVI symptoms. The study is ongoing, and results are presented for the first 10 treated patients. This abstract was published in the Journal of Vascular Surgery – Venous and Lymphatic Disorders in March 2019.

Material and methods: Patients with DVR and correlating symptoms of CVI (Clinical, Etiological, Anatomical, and Pathophysiological [CEAP] class C4-C6) were treated with an endovenous autogenous valve formation system in four centres in New Zealand and Australia. Patients with outflow obstruction were excluded. Retrograde percutaneous access was obtained through the common femoral vein, and contrast venography and intravascular ultrasound were used to assess reflux and to identify potential treatment sites. If the patient was deemed eligible, the 16F study device was introduced and used to form monocuspid autogenous tissue valves in femoropopliteal vein segments spanning 7 to 11 mm in diameter. Intravascular ultrasound and venography were used to assess valve functionality. Post-procedurally, patients were prescribed seven days of low-molecular-weight heparin injections, followed by six months of anticoagulation. Follow-up included duplex ultrasound scan, physical examination, and questionnaires. Deep venous thrombosis (DVT) was defined as a treated vein found to be non-compressible with visible echogenic thrombus or dilated with decreased flow by ultrasound. Mural thrombus was a deposition that did not fit the DVT criteria.

Results: The patients were clinical class C4 ($n = 3$), C5 ($n = 2$), and C6 ($n = 5$) and of both primary ($n = 8$) and secondary ($n = 2$) aetiology. One or more monocuspid valves were successfully formed in 9 of 10 patients. One valve formation was completed in four patients, two formations in four patients, and three formations in one patient. In preference, seg-

mental monocuspid valves were created on the opposite walls of the vein. The anatomy did not accommodate successful valve formation in one patient. Follow-up ranged from 30 to 210 days, with a median of 30 days. During this time, no occlusive DVTs were reported, and adverse events related to the device or procedure included access site-related events (n = 7) and mural thrombus (n = 3). All mural thrombi resolved by 90 days. One access site bleeding event required surgical correction. At 30 days, there was a median reduction in reflux time (seconds) in the proximal femoral vein of 0.3 (-1.9 to 4.3), in the distal femoral vein of 0.4 (-1.4 to 5.6), and in the mid popliteal vein of 0.2 (-3.3 to 6.7). Seven of 10 patients had a greater than four-point improvement in the Venous Clinical Severity Score.

Conclusions: Endovenous valve formation in the deep venous system is feasible. Initial experience suggests that it may be safe and effective for treatment in DVR.

NEUROLOGICAL EVENTS FOLLOWING ULTRASOUND-GUIDED FOAM SCLEROTHERAPY USING SODIUM TETRADECYL SULPHATE (FIBROVEIN)

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Objectives: Ultrasound-guided foam sclerotherapy (UGFS) is increasingly used worldwide in the treatment of superficial venous disease. Concerns remain regarding the risks of neurological adverse (AEs) (headache/migraine/visual disturbance) and serious adverse events (SAE) (cerebrovascular events). Although studies suggest that these are rare after UGFS, the exact incidence is unknown. The aim of the study was to undertake a post-marketing safety study (PASS) to define the incidence of neurological events after UGFS using sodium tetradecyl sulphate (STS, Fibrovein, STD Pharmaceuticals Ltd., UK).

Material and methods: A prospective, multicentre, international (UK and France), observational PASS. Data were collected from private and government (UK NHS) treatment centres from 1 January 2015 to 14 February 2019. Patients' baseline and treatment variables were recorded. Post-UGFS neurological events were reported to the co-ordinating centre and SAEs communicated to pharmacovigilance officer within 24 hours.

Results: 8387 treatments (34.1% male, mean age 55 years, range 14-98) performed at 16 UK and two French centres were recorded. 46.9% were treated using UGFS only and 47.8% using UGFS in combination with endothermal ablation (5.3% not recorded). 3% STS was used in 3094 legs, mean volume 8.1 mls, and 1% STS was used in 6104 legs, mean volume 6.5 mls. Most of the foam was prepared with air (91.2%) or CO_2 (6.9%) and administered through a mean of 2.9 injection sites/leg. Forty-two patients (49 legs) suffered a post-UGFS event (0.5%). AEs: 16 patients developed headache/migraine without, and nine with, visual disturbance. Eleven patients had visual disturbance/scotoma only, and one patient had a vasovagal syncope. SAEs occurred in 0.04% patients: one TIA, one temporary weakness, and one stroke. One patient suffered anaphylaxis, giving a total reported SAE incidence of 0.05%. All SAEs resolved completely without permanent sequelae.

Conclusions: This PASS has demonstrated that UGFS using Fibrovein STS is extremely safe with very low incidence of neurological AEs and SAEs.

RELATIONSHIP BETWEEN MEDICAL COMPRESSION AND INTRAMUSCULAR PRESSURE AS AN EXPLANATION OF A COMPRESSION PARADOX

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Objectives: Using standing magnetic resonance imaging (MRI), we recently showed that medical compression, providing an interface pressure (IP) of 22 mm Hg, significantly compressed the deep veins of the leg but not, paradoxically, superficial varicose veins. Aim of this work was to provide an explanation for this compression paradox by studying the correlation between the IP exerted by medical compression and intramuscular pressure (IMP).

Material and methods: In 10 legs of five healthy subjects, we studied the effects of different IPs on the IMP of the medial gastrocnemius muscle. The IP produced by a cuff manometer was verified by a PicoPress™ device. The IMP was measured with a 21G needle connected to a manometer. Pressure data were recorded in the prone and standing positions with cuff manometer pressures from 0 to 50 mm Hg.

Results: In the prone position, an IP of less than 20 did not significantly change the IMP. Conversely, a perfect linear correlation with the IMP (r.0.99) was observed with an IP from 20 to 50 mm Hg. We found the same correlation in the standing position.

Conclusions: We found that an IP of 22 mm Hg produced a significant IMP increase from 32 to 54 mm Hg in the standing position. At the same time, the subcutaneous pressure is only provided by the compression device on healthy subjects. In other words, the subcutaneous pressure plus the IP is only a little higher than 22 mm Hg – a pressure which is too low to reduce the calibre of the superficial veins. This is in accordance with our standing MRI 3D anatomical study, which showed that, paradoxically, when applying low pressures (IP), the deep veins are compressed while the superficial veins are not.

RELATIONSHIP OF REFLUX PATTERNS TO HEALTH-RELATED QUALITY OF LIFE AND CLINICAL SEVERITY SCORES

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Objectives: Previous studies in chronic venous disease (CVD) have shown clinical severity and health-related quality of life (HRQoL) to be correlated with venous diameters, junctional incompetence, and reflux patterns in the superficial venous system. This prospective study aims to further determine whether reflux patterns of the deep, superficial, and perforating venous systems correlate with clinical severity and HRQoL.

Table 1. Patterns of reflux

Reflux extent
No reflux (NR)
Perforator reflux only (PR)
Superficial reflux only (SR)
Deep reflux only (DR)
Superficial and perforator reflux only (SPR)
Deep and perforator reflux only (DPR)
Deep and superficial reflux only (DSR)
Deep, superficial, and perforator reflux (DSPR)

Material and methods: Asymptomatic controls and CVD patients were prospectively recruited in a single centre. All participants provided informed consent for inclusion. Participants' deep, superficial, and perforating venous systems were assessed using duplex ultrasound. At the same time, scores from the Aberdeen Varicose Vein Questionnaire (AVVQ), Clinical, Etiological, Anatomical, Pathophysiological (CEAP), and Venous Clinical Severity Score (VCSS) were recorded. Based on combinations of deep, superficial, and/or perforator reflux, participants were stratified into eight reflux patterns (Table 1). One-way ANOVA with multiple comparisons was used to compare scores between patterns. Participants with any superficial reflux were then further subdivided based on junctional competence, and scores were compared using one-way ANOVAs.

Results: 595 participants were included, with 490 patients (61% female, 54.4 ±16.6 years) and 105 controls (62.9% female, 36.2 ±12.3

years). The majority of reflux patterns were associated with increased clinical severity and worse HRQoL scores when compared to the no reflux group (all $p < 0.05$), except for isolated deep reflux or deep and perforator reflux (Fig. 1). Clinical and quality of life scores were significantly worse in the deep, superficial, and perforator reflux (DSPR) group compared those with superficial reflux (SR) alone (CEAP: $p = 0.001$, VCSS: $p = 0.013$, AVVQ: $p < 0.001$). No significant difference was seen between pairwise comparisons of the other reflux patterns. Significantly higher CEAP, VCSS, and AVVQ scores were recorded in the DSPR group regardless of junctional competence compared to SR with junctional competence ($p < 0.05$) (Fig. 2). This difference was not seen when compared to SR patients with incompetent junctions. Additionally, increased CEAP stages were associated with the presence of deep and superficial reflux with junctional incompetence compared to SR with junctional competence (mean CEAP 3.40 ±1.42 vs. 2.35 ±1.24).

Conclusions: Increasing the extent of reflux and the presence of junctional incompetence is associated with worsening HRQoL and clinical severity.

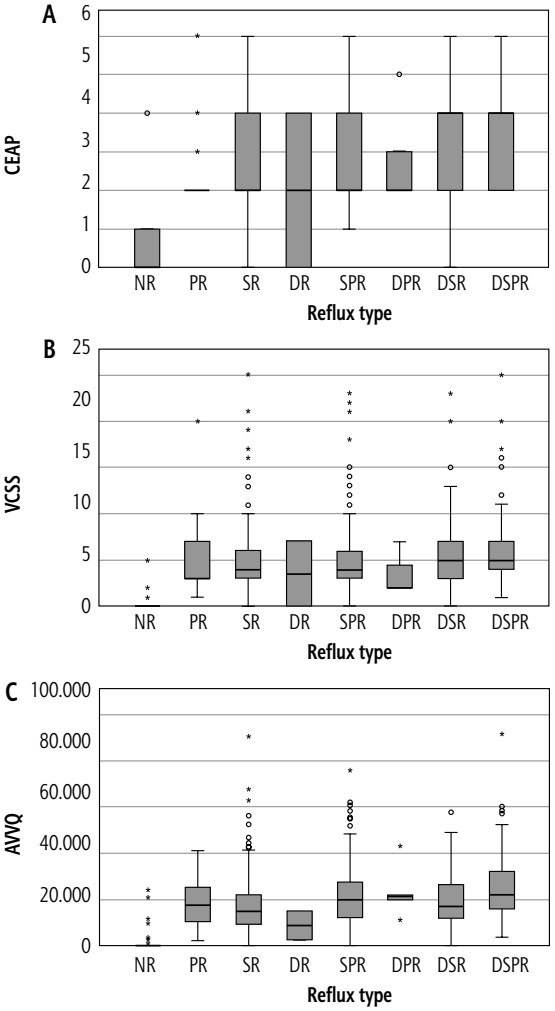

Fig. 1. Boxplots comparing CEAP clinical class, VCSS, and AVVQ scores across the reflux patterns

EGYPTIAN EXPERIENCE IN VENOUS ULCERS – ABOLISHING THE MOST DISTAL REFLUX: DOES IT COUNT?

Wassila Taha, Rashad Bishara
Vein Clinics of Egypt, Egypt

Objectives: The treatment of healing venous ulcers continues to be a challenge, and it has an important socio-economic impact on societies. Compression therapy helps prevent recurrence but fails to heal ulcers

Material and methods: A technique of Abolition of Distal Reflux Source (ADRS) (a superficial venous network; we call it ulcer veins) in the vicinity of the ulcer was used. The aim of the procedure is to interrupt the venous hypertension transmission at the ulcer level, in order to enhance the healing process. By duplex guidance, a 0.5% concentration of polidocanol foam is injected into those bunches present in the vicinity of the ulcer. All targeted veins must have documentation of reflux and have continuity with the primary source.

Results: 162 patients were treated. All had long-standing ulcers, for over five years, prospectively collected from 2014 until 2018, and had been compliant with compression therapy. All patients were CEAP (clinical, aetiological, anatomic, pathophysiological) class 6, with a venous clinical severity score ranging from 12 to 22. 105 patients (68.1%) had primary venous ulcers, and 53 patients suffered secondary venous diseases. Complete healing of all venous ulcers was achieved in 126 patients (89.3%), with a mean follow-up of 48.8 months (16.8-66.6 months), and with an average time to ulcer healing of six to eight weeks.

Conclusions: Abolition of Distal Reflux Source (ADRS) is a safe and effective treatment to heal venous ulcers. Local reduction of venous hypertension is the underlying factor for promoting rapid healing. More studies and careful documentation will probably prove the validity of this treatment regime.

SCORE 9-1: INSTRUCTIONS FOR USERS AND CLINICAL APPLICATION

Anelise Rodrigues[1], Kasuo Miyake[2]
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[2]Clinica Miyake, Sao Paulo, SP, Brazil

There are a few classifications we use when dealing with varicose vein patients, the most well-known are CEAP and VSS. But on a daily basis, they are sometimes lacking in guiding the surgeon towards the best treatment for a given situation, especially when treating patients with aesthetical complaints. We must remember that many times, the aesthetical lesion is just the "tip of the iceberg". A patient classified as "C1", for example, may have an underlying asymptomatic saphenous reflux, which may prevent the lesion from disappearing. With that in mind, as an option to help vascular surgeons to decide on the treatment, whether for aesthetical reasons or not, Kasuo Miyake and Robert Pires Davison developed the score 9-1 table. They intended not to replace other existing scores, such as CEAP or VSS, but to complement them, to get the best possible treatment for each patient. The purpose of the score is basically to separate the surgical/functional from the pure aesthetical treatments. After a proper assessment, with a history of the patient's disease and careful physical examination, we perform Doppler ultrasound to check on truncal/perforator reflux and use augmented reality to identify feeder veins. With this data, we distribute the patient on the table (Image 1), with two main cut points: presence or not of truncal/perforator reflux on ultrasound and presence or not of feeder veins on augmented reality. The "ideal" aim of the treatment is to get a score of 1.

	No spider vein	Isolated TGC, no feeder vein	Spider veins connected to feeder veins
No varicosities	1	2	3
Small/medium caliper varicosities	4	5	6
GSV/SSV perforators insuficiency	7	8	9

SCORE 9–1: The red line represents duplex US and the green line, augmented reality

Score 9-1 description: 1. Normality – no disease. 2. Simple telangiectasias, 3. "Spider veins". Very small feeder veins, sometimes arterialised. When found in chest and face they may be a sign of hepatic disease. 4. Reticular veins with no telangiectasias, common in popliteal area. 5. Reticular veins and telangiectasias, but with no connection between them, 6. The most prevalent on Clinica Miyake sample. Telangiectasias connected to feeder veins. 7. Varicose veins with saphenous/perforators reflux, without telangiectasias. 8. Score 7 but with simple telangiecta-

sias. 9. Second most common. Telangiectasias, feeder veins, and axial reflux. As for treatment, we can sum up as follows: Score 1 – No disease. Our primary goal. Score 2 and 3 – Sclerotherapy/laser. Scores 4, 5, 6 – On Clinica Miyake we use CLaCS (Cryo-laser Cryo-Sclerotherapy) on veins up to 1.5 mm, and microphlebectomy for larger veins. There are other options for treating those veins, such as foam, and they may vary according to each one's practice. Scores 7, 8, and 9 – "Surgical" scores. The type of procedure, once again, depends on each surgeon's practice, be it phlebectomy, stripping, laser, foam, radiofrequency, glue, or another. So, we may say that score 9-1 is a useful and easy to use tool to help improve results of varicose vein treatment.

TRANSDERMAL LASER FOR VARICOSE VEINS: FROM PHYSICS TO PRACTICE

Luiz Fernando Albernaz, Daiane Schlindwein Albernaz
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In our daily activities, we are surrounded by electromagnetic energy from our smartphones, microwaves, X-rays, and mainly sunlight. It is always is the same energy, but with different wavelengths that can be measured. When a laser beam runs into a material, some energy is reflected and scattered. The greater the degree of absorption by the target, the greater the degree of transformation to heat. The targets are vessels, pigmentation, or saphenous veins. Each one has components of their tissues sensitive to a different wavelength, called the chromophore, with affinity for a determinate wavelength. In the visible light spectrum, we can find mostly laser wavelengths, like KTP, IPL, Band, and Nd: YAG. In the band of pulsed light and Q-switching, for example, we can find affinity for haemoglobin and melanin. This is good for the treatment of pigmentations and superficial vessels. In the band of Nd: YAG 1064 we can reach haemoglobin better than melanin, so is safer than short waves. Some water absorption is responsible for the pain. After 800 nm the laser starts to heat the water present in the tissues and becomes painful. Its use is very important for endovenous ablation when we want to heat the saphenous vein walls in spite of the blood inside (Fig. 1). An appropriated interaction would produce target heating, while excessive energy could burn the surrounding structures. According our objective of selective targeting of chromophores, three parameters have to be kept in mind: the dose of radiant energy, the time of the exposure, and the spot size. Different targets need different times to absorb the heat. According to the principles of selective photothermolysis, the laser pulse width should be less than or equal to the vessel thermal relaxation time. At this image we show see a target and a laser beam recorded in very slow motion. If we pay a special attention to this image, we can see the exact moment that the laser shot stopped, but the target remains heated. In this case we released a pulse width less than the vessel TRT, a total desirable effect. Finally, we filmed a simultaneous laser firing with the same energy but with different spot size. If we observe the target as a depth reference, we would observe a different depth reached. (Image 3) This can be explained because the larger spot sizes keeps scattered photons in the beam path, increasing the energy density in the target. It is especially important for the CLaCS technique in which we want to treat deeper vessels like reticular veins combined with sclerotherapy.

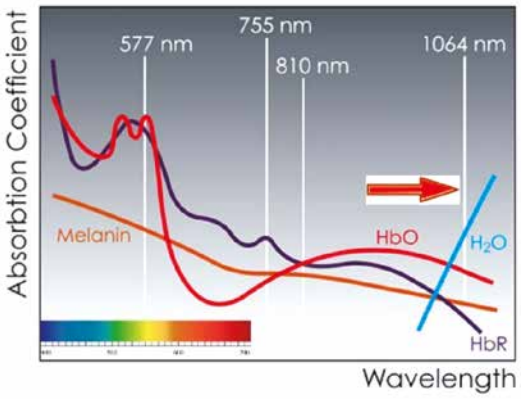

Fig. 1.

Fig. 2.

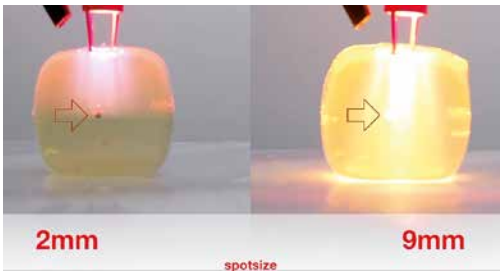

Fig. 3.

THE ASSOCIATION BETWEEN TRANSDERMAL LASER AND POLIDOCANOL FOAM. ADVANTAGES AND DISADVANTAGES

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Telangiectasias of the lower leg represent the most common complaint among patients seeking consultation for venous disease. Telangiectasia represents one of the cutaneous manifestations of venous disease and affects over 80% of the population. Telangiectasias are rarely an isolated condition but are usually associated with incompetence in other elements of the venous system, and 89% of patients have reticular feeder veins. Sclerotherapy continues to be the gold standard treatment for clearing telangiectasias and reticular veins with a diameter of less than 4 mm. Foam sclerotherapy exponentially promotes greater contact surface, and allows larger total volume and lower concentration for an equivalent effect of liquid sclerotherapy. Foam produces vasospasm (up to 80%) greater than liquid, increasing the likelihood of therapeutic success. However, with increased vessel diameter, there is a need for increased sclerosant concentration, and there may be more complications such as pigmentation and matting. In order to reduce such inconveniences, we used transdermal laser in low fluency prior to sclerotherapy to cause thermal injury, reducing vessel diameter and acting synergistically with sclerosant. The goal is to use foam in a minimal concentration of polidocanol foam (up to 0.5%) to reduce the incidence of side effects. This minimally invasive and office-based technique aims to avoid phlebectomies.

CURRENT DVT MANAGEMENT STATUS: DATA FROM A CHINESE DVT REGISTRY DATABASE

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In 2013, the China Medical Association organised the Chinese VTE Patient Management Program nationwide. By January 2 2019, a total of 79 centres were registered, including 73 centres with a total of 14,228 patients. Among all the patients, 48.8% were males with an average age of 58.5 years. The main DVT risk factors are five cathegories of surgery and immobilisation, hypertension, injury, bone fracture, malignant tumours, and stroke, paralysis, or long-term bed rest. 92.2% of the patients showed swelling in the affected limbs, 41.4% of the patients showed Increased muscular, and 98.6% of the patients had a definitive diagnosis, of which 13.0% were patients with PE. The course of DVT

was 96.1% in 0-3 months, and the ratio of surgical and non-surgical treatment was about 1:2. Among them, 69.1% of patients used anticoagulant drugs. Entire enrolled patients there are accounted for 85.5% have been no follow-up.

DOACS IN CANCER-RELATED DVT TREATMENT

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Risk of venous thromboembolism (VTE) vary from cancer diagnosis to its treatment. The annual incidence rate of the cancer related DVT or cancer-associated thrombosis (CAT) is from 0.5 to 20%, and it depends on the type and location of cancer, metastasis status, cancer treatment (surgery or chemotherapy), usage of central venous catheter, hospitalisation, and patient's risk factors. Since their appearance in the early 2000s, NOAC (later on DOAC – dabigatran is direct thrombin inhibitor and apixaban, edoxaban, and rivaroxaban are inhibitors of activated Xa factor) quickly replaced all traditional anticoagulants in the treatment of VTE due to its easy administration and minimal monitoring requirements. Nonetheless, DOAC usage in cases of CAT was limited due to lack of evidence. Until recently, all data was received from subgroup analysis of randomised clinical trials in patients with CAT (RE-COVER I, RE-COVER II, EINSTEIN-DVT, EINSTEIN-PE, AMPLIFY, Hokusai VTE). In these trials, a small number of patients with active cancer was included. VKA, not LMWH, was as the compared medicine, and it appeared to be inferior to LMWH in terms of CAT treatment, risk of recurrence, and bleeding rate. NOACs have shown a non-significant decrease of VTE recurrence and lower major or clinically relevant bleeding rate compared to VKA. However, cancer patients in these trials were healthier (and had lower mortality than patients in CLOT study. In the Hokusai VTE-Cancer, Select-D, and ADAM VTE trials patients with active cancer were enrolled aligning to a new definition of "active cancer".

In the Hokusai VTE-Cancer study, the recurrence rate of VTE was non-significantly lower in patients who received a combination of edoxaban with LMWH than on dalteparin only. The incidence of major bleeding was significantly higher in the edoxaban with LMWH group. The mortality rate was not substantially different between groups, and most of deaths were caused by cancer. The number of deaths associated with VTE or bleeding was too small to make comparison between groups. In the Select-D study rivaroxaban was associated with a lower rate of venous thromboembolism recurrence compared to dalteparin at six months. The rate of major bleeding was numerically higher in the rivaroxaban arm but with a similar rate of fatal bleeding. Overall survival was also similar between treatment arms. In these trials it was also noticed that patients with gastrointestinal or genitourinary cancer were at high risk of major bleeding associated with DOAC treatment.

Results of the ADAM VTE trial showed very low bleeding and venous thrombosis recurrence rates compared to dalteparin, but the data have not been included in guidelines yet. ESC2017, ESMO2017, NCCN2018, ISTH 2018, Canadian Expert Consensus 2018 recommend LMWH as the choice of treatment for patients with CAT within six months and more. Only edoxaban and rivaroxaban are recommended for cancer patients with acute VTE, low risk of bleeding, and no drug-drug interactions with current systematic therapy. The treatment choice should be based on the type and location of the cancer, an assessment of the risk of bleeding, concomitant chemotherapy, drug interactions, and patient's preferences.

CHRONIC VENOUS DISORDERS: PATHOGENETIC AND BIOMOLECULAR MECHANISMS

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Objectives: Chronic venous disorders (CVeD) are common lower extremity pathologies of great medical and socioeconomic importance. The sum of all research endeavours on CVeD is fundamental for a better understanding of the haemodynamic and bio-molecular interactions at the basis of the onset of CVeD, and for developing even more targeted therapies.

Material and methods: A literature search of recent studies was performed to summarise the main haemodynamic and biomolecular aspects at the basis of the onset and progression of CVeD.

Results: Haemodynamic alterations have been widely accepted as the common pathogenetic mechanism of almost all CVeD stages. These abnormalities pave the way for a self-sustained vicious cycle. Shear stress and haemodynamic dysfunctions transduce mechanical stimuli into harmful bio-molecular signals, driving proteolytic remodelling and inflammatory processes. This intricate network is further exacerbated by the degradation of protective endothelial glycocalyx.

Venoactive and endothelial protective drugs (e.g. glycosaminoglycan-based compounds) may attenuate the proteolytic shedding of glycocalyx, counteracting the haemodynamic, inflammatory, and proteolytic harmful effects in venous disorders, in both early and late stages of chronic venous insufficiency (CVI).

Conclusions: A better comprehension of the haemodynamic, inflammatory, and proteolytic mechanisms may help to orientate toward more targeted therapies meeting the needs of patients with CVeD. The use of veno-protective drugs (e.g. glycosaminoglycans and flavonoids) represents a key treatment of CVeD and CVI, for counteracting the harmful effects of inflammatory and proteolytic processes.

Reference: Ligi D, et al. Int J Mol Sci 2018; 19: E2544.

NETOSIS AND THROMBOSIS: A PATHOPHYSIOLOGICAL REVIEW

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Objectives: Significant evidence implicating an important role for neutrophils in thrombosis has been reported, even though their impact on the thrombotic process remains a matter of discussion. We will summarise the state-of-the-art of all research endeavours on "immunothrombosis", fundamental for a better understanding of the bio-molecular interactions among endothelial cells, neutrophils, and platelets.

Material and methods: A literature search of recent studies has been performed to summarise the main biomolecular aspects at the basis of the onset, progression, and linkage between NETosis and thrombosis.

Results: Haemostasis is a physiological process, maintaining blood fluidity and preventing blood loss after vessel wall injury, through bio-cooperation among specialized cellular components and coagulation proteins. The quiescent system is rapidly activated upon vascular injury, generating a thrombus; these events may be fatal in some circumstances, and so a better understanding of biomolecular events is crucial for developing novel therapeutic approaches. Recently, the role of neutrophils in thrombosis has been demonstrated, showing how neutrophil-derived microparticles and neutrophil extracellular traps (NET) contribute significantly to thrombosis through release/extrusion of DNA, histones, and proteinases from vital intact neutrophils. All these aspects highlight the emerging role of NETosis as a major contributor to the prothrombotic state in both arterial and venous thrombotic events. DNAase, heparins, PAD-4, and P-selectin inhibitors may represent anti-thrombotic agents with potential novel mechanisms for future targeted therapies.

Conclusions: A better comprehension of the inflammatory and proteolytic mechanisms linking neutrophils to platelets may help to understand the processes involved in immunothrombosis and to orientate toward more targeted therapies for both arterial and venous thrombotic events. We have to understand how best to utilise these data to formulate drugs that decrease the pro-thrombotic milieu, that do not affect haemostasis, and that counteract the harmful effects of venous and arterial inflammatory and proteolytic processes.

COMPLEX TECHNIQUE OEDEMA REDUCTION WITH UNNA BOOT AND COMPRESSION STOCKING FOR CONTROL OF INFLAMMATION AND INFECTION: OPTIMAL ULCER TREATMENT

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Objectives: There are multiple methods and medication for the treatment of infection and inflammation, so reviving an old technique for treatment of venous ulcer seems to be as effective as new medicine with less cost and greater convenience.

Material and methods: Patients were selected with venous ulceration (C6), cellulitis, venous oedema (CEAP C3) inflammation, and lipodermatosclerosis (C4). FBC and wound culture swab. No antibiotics. Cardiac and BP monitoring. Patients' beds were placed in the Trendelenburg position as per tolerance for one hour. A pneumatic compression device was applied with pressure 60-80 mm Hg as per tolerance for one hour. Leg sprayed with super-oxidised solution twice and left to dry. Four layers of dressing were applied: zinc paste bandage with low elasticity; wool bandage; net tubal bandage; compression stocking, 23 mm Hg pressure. The procedure was repeated weekly. After achieving the goal, a class II compression stocking was used

Results: All the patients that completed the treatment course were fully healed (ulcers were fully closed, no inflammation or infections). Two patients stopped the treatment after a few days. With this method, we managed to effectively control the oedema and its complication to reach a stage at which we could address the causative factor of disease with minimal time and least cost of treatment.

Conclusions: Oedema reduction and proper compression therapy is effective in symptomatic treatment of lower leg oedema and its complications, thus patient compliances and comorbidities can affect the general outcome.

MECHANO-CHEMICAL ABLATION OF THE GREAT SAPHENOUS VEIN: MEXICAN EXPERIENCE

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Objectives: For a long time we have been using a lot of devices with the mean objective to treat superficial venous insufficiency. According to the appearance of endovenous ablation techniques, we have progressed to an initial way of performing thermal ablation of the great saphenous vein, obtaining favourable results and according to the published studies. In relation with the non-thermal ablation techniques, we have performed endovenous chemical ablation with a lot of variants and clinical tools, including eco-guided procedures. In recent years in Mexico we have gained admission and access to Mechano-Chemical Ablation exclusively with Clarivein catheter, obtaining significant results in our patients with a very low incidence in complications, demonstrating favourable therapeutic benefit. OBJECTIVES: To demonstrate the benefits of non-thermal ablation on the great saphenous vein in our initial study; to offer a safe, comfortable and ambulatory procedure to our patients; and to reduce the low incidence of the complications and demonstrate similar results in the short-term in comparison with thermal methods.

Material and methods: We conducted a retrospective review of the first clinical cases of mechano-chemical ablation of the great saphenous vein, which we performed in the first year of treatment with an initial follow-up to the first year. Technique: Inside the OR or Radiology suit with a sterile technique previously with echography mapping, we started the procedure placing local anaesthesia with lidocaine 2%. With ultrasound-guided puncture we place the micro-introducer 4-5Fr in the GSV, then we introduced the Clarivein catheter and located the catheter tip 2 cm from the SFJ. Start ablation to 3500 rpm in the first part only performed mechanical phase for 15 seconds, and then we continued with mechano-chemical ablation, removing the catheter every cm in seven seconds, releasing 2% polidocanol at a rate of 0.2 ml/cm. Then the Clarivein catheter and micro-introducer were removed and local compression was applied. The distal segment of the GSV was treated with foam sclerotherapy. At the end of the procedure a compression bandage or stocking was applied together with a prophylaxis with an anticoagulant.

Results: The first cut to our initial group was 50 great saphenous veins, of which 58% were left and 42% were right. The GSV oclussion rate under ultrasound control was 94% in the first month, 97% in the second month, and 98% in the third to sixth month. Complications were in 4% with a thrombosis in the SFJ. Minor events like bruises, ecchymosis, phlebitis, and hyperpigmentation were seen in at least 10% of the cases.

Discussion and conclusions: Non-thermal ablation with a Clarivein catheter is safe and comfortable for our patients, with a high venous total occlusion rate without neurological and skin damage. We can obtain similar results with endovenous laser and radiofrequency ablation. Venous thrombosis after the procedure is possible with a very low incidence, and sometimes miniphlebectomy and/or complementary sclerotherapy is necessary.

CLINICAL SYMPTOMS AND SIGNS AND SEVERITY OF VENOUS DISEASE ARE NOT ASSOCIATED WITH NON-THROMBOTIC ILIAC VEIN LESIONS IN PATIENTS WITH PRIMARY VARICOSE VEINS

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Objectives: Non-thrombotic iliac vein lesions are common and often asymptomatic. On the other hand, they are thought to produce symptoms such as leg oedema and pain. The purpose of this study was to determine if there is any relationship between non-thrombotic iliac vein lesions and the symptomatology of primary varicose veins. The identification of such an association would be helpful in selecting patients with primary varicose veins for further diagnostic evaluation.

Material and methods: Thirty-three patients with unilateral primary varicose veins (PVV) scheduled for great saphenous vein high ligation and stripping were enrolled in the study. There were 25 (76%) women. The mean age of the patients was 48.2 years. Fourteen patients (42%) had varicose veins of the left lower extremity, and 19 (58%) patients had varicose veins of the right lower extremity. The patients were asked about pain, oedema, night cramps, heaviness, and superficial thrombophlebitis in the PVV limb. Based on the history taking and physical examination, a clinical stage of CEAP classification was determined and Venous Clinical Severity Score (VCSS) was calculated. During the varicose vein surgery, inferior vena cava and right and left iliac venous axes were interrogated with an intravascular ultrasound with the Volcano s5 Imaging System (Volcano Corporation, Rancho Cordova, CA, USA) and Visions PV.035 catheters, and the mean lumen area (MLA) and percentage of stenosis (%S) of the examined veins were calculated. An association between clinical symptoms and signs in the PVV limb and stenosis of the inferior vena cava (IVC) and ipsilateral common iliac vein (CIV) and external iliac vein (EIV) was statistically analysed.

Results: Leg pain, oedema, night cramps, heaviness, and history of superficial thrombophlebitis were reported by 14 (42%), 17 (52%), 11 (33%), 19 (58%), and six (18%) of patients, respectively. Twenty-five (75%) limbs were classified as C2 and eight (24%) limbs as C4a according to CEAP classification. The median VCSS was 4. The mean MLA and %S was 148.4 mm^2 and 45%, 92.9 mm^2 and 47%, and 74.2 mm^2 and 48% of IVC, CIV, and EIV, respectively. Neither smaller MLA nor greater %S of IVC, CIV, and EIV were associated with symptoms, more advanced stage of CEAP classification, or higher VCSS.

Conclusions: Neither clinical symptoms nor severity of venous disease can identify non-thrombotic iliac vein lesions in patients with primary varicose veins.

THE RELATIONSHIP BETWEEN CLINICAL SEVERITY TOOLS, INCLUDING THE VILLALTA SCALE, AND QUALITY OF LIFE IN A POPULATION OF PATIENTS WITH PRIMARY VENOUS DISEASE

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Objectives: There exist a number of validated clinical severity tools employed in superficial venous disease, endorsed by clinical practice guidelines. These include the Clinical Aetiological Anatomical Pathophysiological (CEAP) and Venous Clinical Severity Score (VCSS). The Villalta scoring system is a separate tool used for the diagnosis of post-thrombotic syndrome; it was, however, never formally published, and questions have been raised regarding its validity, particularly in the context of primary chronic venous disease. The Aberdeen Varicose Vein Questionnaire (AVVQ) is a validated quality of life tool used in patients with chronic venous disease. AVVQ scores have previously been shown to correlate with clinical severity as measured by CEAP and VCSS. The aim of this study was to assess the relationship between clinical and quality of life assessment tools in patients with venous disease, including the Villalta score.

Material and methods: Patients with clinical evidence of superficial venous disease were recruited from a single centre over a one-month period. All patients were asked to complete the AVVQ, and the recruiting clinician examined each patient and scored the patient according to the CEAP, VCSS, and Villalta tool. Spearman's correlation was performed to assess any association between the clinical severity tool and the quality of life score. SPSS® software was used to perform the analysis.

Results: Thirty-six patients (75% female) were recruited, with a mean age of 61 years (range 27-95). Each AVVQ questionnaire and clinical severity proforma was scored by a health care professional and the outcome recorded on a spreadsheet. Correlations performed Spearman's rank correlation coefficient CEAP vs. AVVQ R = 0.414409 Villalta vs. AVVQ R = 0.438646 VCSS vs. AVVQ R = 0.386225. These values showed a moderate correlation ($R > 0.4$) between the CEAP and Villalta scoring system with the results of the AVVQ questionnaire. There was, however, a weak relationship between the VCSS scores and the AVVQ questionnaire in this cohort of patients.

Conclusions: These results demonstrate that clinical severity scoring moderately correlates with patient-reported symptom burden as assessed by the AVVQ questionnaire. Of particular interest, the Villalta scoring system also demonstrates a moderate relationship with the AVVQ outcomes.

EPIDEMIOLOGICAL SEARCH FOR CHRONIC VENOUS DISEASE IN EL SALVADOR

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Objectives: Epidemiological publications on venous disease in Central American countries are difficult to find, due to lack of interest among Public Health Systems. However, knowing that sex and age are the main search variables and that medical speciality and level of care can facilitate the diagnosis of the venous disease, it is possible to find useful and objective information in large databases that health systems collect in all their services nationwide. By exploring this official information we can find epidemiological data of the venous disease treated in the largest provider of health services in El Salvador. The aim of the study was to show basic epidemiology information on the care of venous disease in surgery services in El Salvador during the years 2014-2018

Material and methods: A descriptive study of care in surgery services at the primary and hospital level between the years 2014 and 2018 in the public health system.

Results and conclusions: Attention to venous disease, in any of it is manifestations, begins in the primary levels of care at an early age (14-19 years), becoming the main cause of consultation in the female sex between 24 to 59 years of age; men also initiate their consultation in this age range. At the hospital level, venous diseases in women occupy the three conditions of demand for surgical care over 24 years of age. Ulcers are an important cause of consultation in men of advanced age. The female-male consultation ratio is 9:2. The diagnoses of venous diseases are of little epidemiological interest, but they consume a high amount of resources and attention in public institutions, affecting the age range of high labour production.

BACTERIOLOGY OF VARICOSE VEINS – THEIR PRESUMPTIVE ROLE IN THE PATHOGENESIS OF ULCER FORMATION

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Objectives: One of the hypotheses of leg venous ulcer aetiology is, besides venous insufficiency, bacterial damage of the vein wall by microbes accidentally penetrating injured foot skin. Invading bacteria enter lymphatic and venous circulation through the capillary wall, adhere directly to endothelial cells, or are phagocytised by granulocytes adhering to the venous wall – a well-documented phenomenon. Damage of the vein wall causes secondary changes in adjacent skin. Eventually, an ulcer may be formed. Ulcers are then secondarily colonised by bacteria dwelling on neighbouring skin and by microbes floating down on desquamated perineal epidermal cells. The aim of the study was to identify bacterial cells and their DNA in varicose veins (C2 CEAP classification) and leg venous ulcers (C5-6), with respect to the frequency of phenotypes and their similarities in veins and ulcers.

Material and methods: Studies were carried out in 100 randomly selected patients with varicose veins (C2) and 50 patients with leg ulcers (C5-6). Saphenous vein specimens were harvested during elective operations, whereas controls were from organ donors. Ulcer tissue biopsies were made. Bacteriology (culture, 16sRNA, and genetic similarity using pulse electrophoresis) and immunohistochemical staining were done.

Results: Bacterial isolates were identified in varicose veins in 40% of specimens and bacterial 16sRNA (DNA) in 52%. Control veins were positive in 4%. Skin at the disinfected incision site for vein harvesting contained proliferating bacteria in 4%. Venous ulcers were infected in 100%. Veins and ulcer granulation tissue were colonised mostly by Staphylococci, both aureus and coagulase-negative; however, ulcers also revealed the presence of gram-negative bacilli. Genetic similarities between skin and vein staphylococci were found in 85% of cases. Fifty-two per cent of varicose vein specimens were infiltrated by granulocytes and macrophages. **Conclusions:** Bacterial colonisation may be a factor in the pathomechanism of damage of lower limb superficial veins (varices) and facilitate the formation of venous ulcers.

LEG ULCER SKIN EDGE WATER CONTENT, STIFFNESS, CAPILLARY BLOOD FLOW, AND LYMPHATIC DRAINAGE

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Objectives: Epidermis and dermis at the ulcer edge show apparently normal structure with few infiltrates. Macrophages (mf) and a few granulocytes (PMN), no lymphocytes (L), and a few fibroblasts and collagen fibre bundles are seen. However, there is no migration of keratinocytes on the granulation tissue. Is there a functional defect in the skin edge hampering proliferation and migration of keratinocytes? Water excess, insufficient blood supply, and lack of lymphatic drainage? The aim of the study was to study ulcer skin edge water content, stiffness, capillary blood flow, and lymphatic drainage.

Material and methods: In the skin surrounding 10 legs "venous" ulcer water content (%), stiffness (in Newtons), blood capillary flow (point Doppler flow velocity), and lymphatic drainage (near infra-red indocyanine green fluorescence, ICG) (%) were measured.

Results: Water concentration was in the range of 56 to 67% (control 35%), stiffness caused by fluid excess was over 1 N (control 0.06), blood capillary flow ranged between 5 and 20 mV (control over 50 mV), and there was no tissue fluid/lymph drainage. ICG lymphography showed leg lymph bypassing the ulcer region.

Conclusions: Although the microscopical structure of skin surrounding ulcers seems to be normal, there are functional defects such as lack of sufficient supply of nutrients (growth factors?) and drainage of waste products. Support of blood supply by external pumps would be indicated.

FOUR-STEP PLAN FOR EFFICIENT VENOUS ULCER TREATMENT

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Objectives: Venous ulcer is the final stage of chronic venous insufficiency (CVI); its main cause is venous reflux. In our specialised practice we receive a high rate of patients with this complication. After 30 years of experience we have stablished a four-step plan to achieve ulcer healing with low cost for our patients.

Material and methods: Patients with venous ulcer, regardless of its size, who came to our private practice. We performed a clinical examination and then applied our plan: sclerotherapy as the sole method to eliminate varicose veins, elastic compression, hygiene, and physical rehabilitation.

Results: Successful ulcer healing was seen in 80% of the cases, in an average of 10 weeks. More than half of the remains were large ulcers, but they decreased at least 60% in size by the time we closed this study.

The average weekly expense for the patient is 60.00 USD.

Conclusions: It is possible to achieve successful venous ulcer healing at low cost with the correct use of effective resources and education of the patient.

PH CONTROL: A PILLAR FOR THE CLOSURE OF VARICOSE ULCERS

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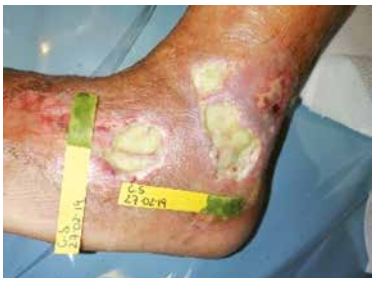
For a long time, we committed to study venous insufficiency as a trigger factor for the appearance of varicose ulcers. From then on, methods, techniques, and treatments were developed to achieve its closure. However, there are no studies or medical practices focused on the control of pH in ulcers. Currently, depending on the characteristics of the ulcer, we can estimate the time it will take to generate epithelial tissue to heal. In Arias Medical Clinic we base our treatment on three stages, having the control of pH as a pillar. The pH value is a measure of hydrogen ion concentration (H^+), measured on a logarithmic scale, with a range of 0-14. From 2015 to 2018 a descriptive, observational, and longitudinal study of 234 patients with varicose ulcers was carried out, in which the values were checked obtaining the following results. 172 presented initial pH between 9 and 12 with latent infectious process, 51 presented initial pH under 4 with stationary evolution, and 11 presented initial pH between 4 and 5 suitable for tissue culture. In all of them, pH was stabilised between 4 and 5, shortening the healing time without recurrence. Variations in the concentration of H^+ in the different fluids of the organism alter the balance of chemical reactions, and in the case of varicose ulcers can generate secretion, changes in smell, various types of tissue, etc. A pH of 7 is considered neutral. If the concentration of H^+ increases, the pH is lower than 7, and is called acid. If the concentration decreases, the pH will be higher than 7, and will be considered basic.

1. Identify, control, and eliminate the infectious process. In the body there are different systems that stabilise tissue pH, including proteins, which bind and release ions. On the other hand, bacteria (the most common microorganisms in varicose ulcers) produce ammonium from the action of urease, returning the alkaline zone. When alkaline values are found it is difficult to eliminate any infectious process.

2. Tissue culture. The ideal pH to maintain a healthy tissue culture is 4 to 5 and not 7 as was believed (I.1-) This pH is essential for the balance of the cutaneous flora and prevents the proliferation of pathogens.



3. Epithelial tissues and scarring. When the healing process begins the pH changes from alkaline to neutral and subsequently acid; it is thought that the pH does not depend on the depth of the wound, but on the type of tissue that exists in the bed.

Conclusions: To promote the healing of an ulcer, it is essential that the tissue tension is increased. A pH decrease of 0.9 units can increase the oxygen diffusion by five times; therefore, it has been demonstrated that wounds with alkaline pH have lower cure rates than those with a pH close to 4.5.

ENDOVENOUS LASER ABLATION 1470-NM IN THE TREATMENT OF VARICOSE VEIN ULCERS

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Objectives: To improve immediate and long-term results of treatment of patients with varicose disease complicated by varicose ulcers using the method of endovenous laser ablation (EVLA) 1470-nm diode laser and 2ring radial fibres of incompetent great saphenous veins with or without the treatment of perforating veins.

Material and methods: In a retrospective study (2013-2018), 104 patients were included (63 women, 41 men) with varicose veins complicated by venous ulcers. The age of the patients was 36 to 84 years. EVLA was performed using a diode laser 1470-nm and radial 2 ring fibres, and a laser power of 10 W. The patients were treated by EVLA only or in combination with miniphlebectomy and/or sclerotherapy of side branches and perforator veins outside the zone of tropic disorders. Treatment of perforator veins could be performed immediately, or at the second session (two weeks – three months after the operation). EVLA of perforator veins was performed in 32 cases (30.7%). Local treatment of varicose ulcers was accompanied by the use of dressings with a solution of antiseptics (chlorhexidine and iodiskin). Compression stockings (23-32 mm Hg) were used for four weeks. The effectiveness of treatment was assessed every three months within one year of the intervention.

Results: In the 104 patients, the technical success rate was 100% (no recanalisation). The varicose ulcers healed in 85 cases (81.7%). At the same time, all patients had a high activity of reparative processes in the varicose ulcer zone in the first weeks after the operation. There were no infectious-inflammatory complications. No major complications occurred, although bruising (4.8%), thrombophlebitis of the side-branches (3.8%), and non-permanent paraesthesia (5.7%) were observed. Sclerotherapy of side branches and perforating veins in the second session was performed for 42 patients (40.3%). There were no recurrences of varicose ulcers.

Conclusions: The implementation of EVLA using 1470-nm diode laser and radial 2ring fibres for the treatment of patients with complicated forms of varicose veins leads to improvement of the results of treatment, avoiding infectious and inflammatory complications. The proposed method of treatment does not require hospitalisation and can be used in outpatient practice. Minimising surgical intervention leads to earlier recovery of work capacity and the patient's return to active life.

ASSESSING THE QUALITY OF CLINICAL PRACTICE GUIDELINES IN CHRONIC VENOUS DISEASE

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Objectives: Chronic venous disease (CVD) is a manifestation of a poorly functioning venous system. Numerous clinical practice guidelines (CPGs) have been developed to assist in the diagnosis and management of CVD. The AGREE II tool (2010) permits an objective assessment of guidelines according to standardised criteria. This work seeks to assess the quality of CVD guidelines using the AGREE II tool.

Material and methods: A systematic review was performed employing the Medline and Embase databases to identify CPGs relevant to CVD. Consensus documents, expert opinions, and articles providing guidance for diagnosis or treatment alone were excluded. The search was limited to evidence-based CPGs available in English and produced in the last 20 years. CPGs focusing solely on venous leg ulceration were excluded. Two independent reviewers assessed the CPGs using the AGREE II tool. The AGREE II tool assesses CPGs across five domains, a score is given for each domain, and an overall score is given. SPSS 25 was used for statistical analyses.

Results: Six CPGs were identified between 2004 and 2016; all were of European and North American origin. The inter-rater reliability when scoring each CPG was evaluated using the Intraclass Correlation Coefficient (ICC); this was > 0.9 ($p \leq 0.002$) for all six CPGs. One CPG had an average score of 81% across all five domains, qualifying as a high-quality CPG. The remaining five CPGs had scores ranging from 16 to 57%. CPGs generally performed poorly in outlining stakeholder involvement, intended use of the guideline, and evaluating how applicable the CPG is to clinical practice (Domain 2 and Domain 5 of the AGREE II tool).

Conclusions: Scores from the AGREE II tool were reproducible when different users evaluated CPGs. CVD encompasses a diverse set of conditions with numerous treatment options; CPGs in CVD are influential in informing clinical practice. We identified one CPG of high quality. Clinical guideline groups should consider using guideline quality assurance tools, such as the AGREE II, when developing CPGs.

INFERIOR VENA CAVA FILTERS IN VTE PATIENTS: UTILISATION IN A TERTIARY CLINICAL CENTRE

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Objectives: Inferior vena cava filters (IVCF) are widely used as a tool for pulmonary embolism (PE) prevention despite the lack of scientific evidence that they provide patient benefit. In our clinic, which is a large tertiary hospital, for IVCF placement we use indications postulated in the guidelines of the Society of Interventional Radiology (2016). The aim of the present study was to retrospectively analyse the utilisation of IVC filter placement in recent years.

Material and methods: The database of patients with VTE hospitalised in the large tertiary clinic in 2016-2017 was analysed.

Results: There were 2399 (48.9% men, 51.1% women, ages 62.4 ±15.2 years) patients with VTE hospitalised in 2016-2017 (1148 and 1251, respectively). 1797 (74.9%) patients had deep venous thrombosis with no PE. 602 (25.1%) had PE with or without concomitant deep venous thrombosis. IVCFs were inserted in 442 patients (18.4%), of them 116 had PE at admission. 437 (98.8%) filters were retrievable. Among patients with no IVCF inserted one patient died of massive PE. Of 442 patients with IVC filters, five died (1.1%). No PE, primary or recurrent, was registered in IVCF cohort. On duplex ultrasound before discharge, occlusion of IVCF was found in 104 (23.5%) cases. In 68 (15.4%) patients, occlusion might be considered as embolic but not as thrombus progression. No IVCF was retrieved during hospital stay. Only 29 (6.6%) filters were removed later.

Conclusions: In a tertiary clinical setting IVCFs were utilised actively in recent years. IVCF occlusion rate was high, but in many cases it might be explained not by thrombus progression but by its fragmentation and migration from below. Nearly all the IVCFs inserted were retrievable. Nonetheless, the removal rate was very low.

PROTHROMBINASE INDUCED CLOTTING TIME IS MORE SENSITIVE THEN APTT AND PT AND CAN BE USED FOR THE MONITORING OF ANTI-XA AGENTS IN WHOLE BLOOD AND PLASMA

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Objectives: Andexanet alfa (Portola Pharmaceuticals, San Francisco, CA) represents a modified factor Xa agent, which is an approved antidote for apixaban and rivaroxaban. Andexanet alfa may also neutralise the anti-Xa effects of betrixaban and edoxaban. This study aims to compare the relative neutralisation of these four anti-Xa agents by andexanet alfa in different matrices.

Material and methods: Andexanet alfa was diluted at 10 mg/ml. Apixaban, betrixaban, edoxaban, and rivaroxaban were diluted in pH 8.4, 0.5 M tris buffer (TB), blood bank plasma (BBP) and in 5% albuminated buffer (AB) at 0.062-1.0 ug/ml. Anti-Xa activities of all four agents were measured in three systems and the reversibility indices of andexanet alfa were profiled. The reversibility index (RI50) of anti-Xa effects by andexanet alfa was determined at 25-100 ug/ml.

Results: Each of the four agents produced varying degrees of inhibition of anti-Xa at 0.062-1.0 ug/ml: the IC50 ranged from 0.61 to 1.53 ug/ml in BBP, 0.47-1.28 ug/ml in AB, and 0.49-1.4 ug/ml in TB. Andexanet alfa produced a concentration dependent reversal of all four anti-Xa agents. In the BBP, the RI50 value for apixaban was 192 ug/ml, betrixaban 32 ug/ml, edoxaban 152 ug/ml, and for rivaroxaban 85 ug/ml. In the AB, the RI50 value for apixaban was 140 ug/ml, betrixaban 46 ug/ml, edoxaban 176 ug/ml, and for rivaroxaban 58 ug/ml. In the TB, the RI50 value for apixaban was 154 ug/ml, betrixaban 79 ug/ml, edoxaban > 400 ug/ml, and for rivaroxaban 110 ug/ml.

Conclusions: The four anti-Xa agents exhibit varying degrees of matri-independent anti-Xa potencies in different systems, the collective order follows edoxaban > apixaban > betrixaban > rivaroxaban. Andexanet alfa produced matrix dependent differential neutralisation of the anti-Xa effects of these agents. Andexanet alfa is most effective in neutralising betrixaban and requires relatively high concentrations to neutralise edoxaban.

HEPARIN RESISTANCE DURING THROMBOLYSIS FOR ILIAC-FEMORAL DVT

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Thrombolysis is an aggressive procedure to prevent PTS in the acute iliac-femoral DVT. Anticoagulation is vital in the procedures. However, we found that thrombolysis failed in some young patients when heparin was administrated initially. These patients demonstrated worse symptoms and signs of DVT with normal APTT. The heparin was replaced by factor II antagonists immediately, and the procedures were successful. These young patients with heparin resistance were usually complicated with lupus, antiphospholipid syndrome, or ATIII deficiency. Therefore, heparin resistance should be alerted among these patients. Alternative anticoagulants should be switched whenever heparin resistance occurs.

THROMBOVASIM™ IN COMPLEX TREATMENT OF PATIENTS WITH DEEP VEIN THROMBOSIS

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Objectives: Regardless of the wide use of anticoagulant and fibrinolytic therapy, 80-90% of patients who suffer from acute deep thrombosis have post thrombosis disease, i.e. 28% of all venous diseases. This article reports estimates of the rate of lower extremity deep vein recanalisation depending on the selected anticoagulation therapy scheme in patients with acute deep vein thrombosis.

Material and methods: A comparative prospective clinical trial was studied. In the research were 124 patients with instrumentally verified DVT at iliac-femoral level with no surgical treatment needed. Patients were divided into two groups that were similar by age, sex, and DVT level. In the first control group were included 78 (63%) patients; in the second main group – 46 (37%) patients. Basic treatment of the control group patients was rivaroxaban 15 mg two times per day for three weeks and after that 20 mg daily. The second group of patients was taking Thrombovasim (Russia) in addition, with a thrombolytic effect after the third week of the treatment 800 ED two times per day for four weeks per os. After that, patients were observed for 3-6 months since the beginning of the disease.

Results: The efficiency of the treatment was rated by the presence of thrombotic complications (relapse of DVT and/or pulmonary embolism) and haemorrhage complications. Haemorrhagic complications were divided into three groups: large, significant, and small. The recanalisation rate was estimated by ultrasound angiography. After six months, 76 patients from the control group and 46 patients from the main group were under watch. One patient in the first group had an increase in thrombus by ultrasound angiography examination. There were no other complications of DVT and/or pulmonary embolism in the groups. Haemorrhagic complications in the first group were founded in four (5.2%) patients; two of them had significant haemorrhage and two of them not. In the second group haemorrhagic complications were founded in four (8.6%) patients; one of them had significant haemorrhage and three of them not. Six months after thrombosis, 50% of patients who were taking only rivaroxaban had full recanalisation, as did 84.7% of patients who were taking Thrombovasim in addition. The percentage of haemorrhagic complications remained the same; the differences were not significant.

Conclusions: In the group of patients who received Thrombovasim in addition to the main anticoagulant therapy, earlier recanalisation of thrombosed deep veins was noted and the degree of recanalisation was higher. A significant reduction in the risk of developing severe forms of post-thrombotic disease was noted.

SYSTEMATIC REVIEW AND META-ANALYSIS OF VENOUS THROMBOEMBOLISM RISK ASSESSMENT TOOLS FOR HOSPITAL INPATIENTS

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Objectives: Venous thromboembolism (VTE) is a common condition with fatal complications, commonly affecting hospital inpatients. Venous thromboembolism is associated with an increase in morbidity, mortality, and associated healthcare costs. There are a range of venous thromboembolism risk assessment models available to risk-stratify hospital inpatients. This systematic review aims to assess the performance of the differing risk assessment models (RAMs) in their ability to predict at-risk hospital inpatients.

Material and methods: This systematic review was undertaken in accordance with PRISMA guidelines following a preregistered protocol (PROSPERO: CRD42018095248). Online searches of the Medline and Embase databases were performed. Included articles reported at least one risk assessment tool assessing the risk of hospital inpatients developing venous thromboembolism. GRADE was performed for included articles. Meta-analysis was performed using RevMan 5, and primary outcome data was pooled.

Results: Twenty-five reviews involving 766,427 patients were identified from 2004-2017, including 18 cohort and seven case control studies. American, Asian, European, International, and Russian studies were included with a mixed medical and surgical cohort. VTE was generally defined by diagnostic imaging, autopsy, or ICD codes. The Caprini, Padua, and IMPROVE RAMs were most frequently externally validated. Twenty reviews were included in the meta-analysis. Patients deemed to be at high VTE risk according to the Caprini, Padua, and IMPROVE RAMs had an increased risk of VTE; OR (95% CI) was 3.38 (2.56, 4.46), 3.5 (2.61, 4.70), and 4.08 (2.89, 5.78), respectively. Other RAMs also reported an increased incidence of VTE in patients stratified at high risk. There was high level of heterogeneity in the meta-analysis (I^2 = 68-79%). The quality of evidence (GRADE) was low across all outcomes. There was a lack of evidence regarding the cost effectiveness of RAMs.

Conclusions: This is the first systematic review and meta-analysis assessing RAMs used to detect in-patients at high VTE risk. In this meta-analysis we demonstrated that RAMs may help stratify patients who are at high risk of developing VTE. Utilising RAMs that provide some stratification can help ensure appropriate allocation of VTE thromboprophylaxis in hospital in-patients. A high level of heterogeneity was demonstrated; this may be due to variations in study design, patient characteristics, VTE definitions, and follow-up intervals. Further work is required to look at the cost effectiveness of RAMs and the possible impacts RAMs may have on complication rates.

VENOUS THROMBOEMBOLISM HOSPITALISATION AND RELATED DEATH: ANALYSIS OF THE NATIONWIDE READMISSIONS DATABASE

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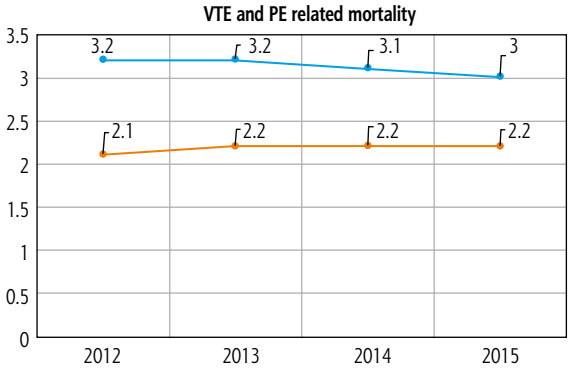
Objectives: Venous thromboembolism involves deep vein thrombosis and pulmonary embolism, and despite the effectiveness of preventive treatments, it carries a considerable mortality rate in the United States, making it a leading cause of preventable hospital death. Furthermore, data regarding the hospitalisation and related death in patients with venous thromboembolism in the United States is unknown. Therefore, our objective was to define trends in VTE-related mortality among hospitalised patients in the nationwide readmissions database.



Material and methods: The study utilised data from patients with venous thromboembolism using the nationwide readmissions database from the years 2012 to 2015. Patients included were at least 18 years of age, and their primary diagnosis code had to match the ICD-9 code for either pulmonary embolism or deep vein thrombosis. All of the analysis was performed using SPSS. Descriptive statistics allowed us to identify common chronic comorbidities, and linear trend tests using chi-square, as well as analysis of variance, were used to identify trends in mortality among patients with venous thromboembolism.

Results: We identified a total of 1,147,425 patients with venous thromboembolism (weighted); 674,973 presented pulmonary embolism

(58.8%). The patients had a mean age of 62.93 years (SD = 17.44), and they were predominantly female (52.4%). Common chronic comorbidities included hypertension (58.4%), deficiency anaemias (20.3%), and diabetes (19.3%). Throughout the study period, there was no significant mortality trend for death in pulmonary embolism (3.2% in 2012 vs. 3.0% in 2015, $p = 0.328$) or any venous thromboembolism (2.1% in 2012 vs. 2.2% in 2015).

Demographics and clinical characteristics		
Variable	**Cohort**	**Percent**
VTE	1,147,425	100
PE	674,973	58.8
Length of stay, mean (SD)	4.72	38.35
Patient-related variables		
Age, mean (SD)	62.93	17.44
Gender (female)	601,465	52.4
Chronic comorbidities		
Hypertension	670,099	58.4
Deficiency anemias	232,817	20.3
Diabetes	40,122	19.3
Heart failure	126,702	11
Renal failure	142,491	12.4
Obesity	220,215	19.2
Fluid/electrolyte disorders	230,574	20.1

Conclusions: During the four years of evaluation, mortality for venous thromboembolism among hospitalised patients did not improve. The lack of progress in improving the pulmonary embolism-related mortality is a call for action for us to both intensify compliance with preventive mechanisms and thoroughly explore failures in VTE care. There is growing interest for pulmonary embolism response teams, whose initiative may help us find an action plan to improve the current stalled mortality trend.

ULTRASOUND-GUIDED MICROTHROMBECTOMY AS AN EFFECTIVE SYMPTOMATIC TREATMENT FOR UNCOMPLICATED SUPERFICIAL VENOUS THROMBOPHLEBITIS

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Objectives: Percutaneous needle puncture and thrombus evacuation has been described classically as an adjunct measure to prevent post-sclerotherapy skin hyperpigmentation, and it was also anecdotally described as a measure of symptomatic relief from venous wall distention by the clot. We questioned the efficacy of this minimally invasive technique in a patient with uncomplicated focal superficial venous thrombosis (SVT).

Material and methods: Ninety-eight consecutive patients (mean age, 48 years) with focal leg pain and fullness with documented venous insufficiency by Doppler ultrasound, who presented to an outpatient vein clinic between February 2006 and November 2011 were reviewed. Among these, 48 patients did not have a prior history of venous disease or treatment, while 50 patients had recent venous interventions including sclerotherapy of saphenous tributaries (45) or endovenous laser therapy (5). Thirty-three patients (33.7%) were found to have SVT, while four patients had alternative diagnoses: soft tissue mass (3) and focal soft tissue infection (1). In the remainder, no clear diagnosis was established.

Results: Among 33 patients with SVT, 12 without prior vein treatment had focally dilated varicosities containing thrombus. Seven had SVT extending into a great saphenous vein, but at least 10 cm distal to saphenofemoral junction. Three had isolated single-segmental tributary SVT, and two had multi-focal involvement within tributaries. The remaining 21 patients were found to have focal, less than 3 cm, tributary SVT without varicosities. One patient (3.1%) was placed on systemic low-molecular-weight heparin due to ascending extension of great saphenous SVT with no further improvement of pain. Thirty-one out of the remaining 32 patients who underwent the needle/catheter microthrombectomy yielded immediate symptomatic relief (96.9%) after draining 0.2 to 4 ml of crankcase-oil-like thick fluid. Three (9.4%) had recurrent pain, and 17 (53.1%) complained of persistent focal hardness, albeit with less pain. No post-procedural complication was observed.

Conclusions: Percutaneous needle microthrombectomy is an effective symptomatic treatment in uncomplicated SVT, which can be performed and repeated in an outpatient setting without significant risks.

RELATIVE NEUTRALISATION OF THE ANTICOAGULANT, ANTIPROTEASE, AND THROMBIN GENERATION EFFECTS OF SULODEXIDE BY A RECOMBINANT XA DECOY ANTIDOTE (ANDEXXA)

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Andexanet alfa (zhzo, coagulation factor Xa recombinant) is an approved antidote for such factor Xa inhibitors as apixaban and rivaroxaban. Sulodexide represents a mixture of fast-moving heparin and dermatan sulphate, which is widely used for the management of deep venous thrombosis (DVT) and chronic venous disease (CVD). Previous studies have reported that Andexxa is capable of neutralising heparin-related drugs. This study investigated the relative neutralisation profiles of Andexxa for sulodexide as measured in different assays. Sulodexide was obtained in powder form (active pharmaceutical ingredient) with a USP potency of 97 + 3 USP units/mg. Sulodexide was dissolved in saline to obtain a stock concentration of 1 mg/ml. Andexanet alfa was obtained from Thrombin generation, the hospital pharmacy (Skokie Hospital, Skokie, Illinois), and reconstituted at 10 ug/ml according to the manufacturer's instructions. Sulodexide was supplemented in citrated human pooled plasma in a concentration range of 0-10 ug/ml. The anticoagulant effects of sulodexide were measured in activated partial thromboplastin time (APTT), thrombin time (TT), and prothrombinase-induced clotting time (PiCT). The antiprotease activities were measured using amidolytic anti-Xa and anti-IIa activities. Thrombin generation studies were carried out using a kinetic method (CAT assay, Diagnostica Stago, Paris, France). Such parameters as peak thrombin generation, area under the curve, and lag time were measured. All of these studies were also carried out on sulodexide mixture in plasma in the presence of 100 ug/ml andexanet. The relative neutralisation ratios were determined for all the individual assays. In the APTT assay sulodexide produced a concentration-dependent increase in the anticoagulant responses at 10 ug/ml, and the clotting time was 200 seconds. Upon addition of andexanet there was a complete neutralisation of the anticoagulant effects in this assay. Similarly, in the thrombin time assay stronger anticoagulant effects were noted; at 5 ug/ml the thrombin time values were greater than 300 seconds. The addition of andexanet completely neutralised the anticoagulant effects of sulodexide in this assay. In the amidolytic anti-Xa assay sulodexide produced a concentration-dependent anti-protease effect with the IC50 of 5 ug/ml. Upon adding andexanet the anti-Xa effect was only partially neutralised, reducing the IC50 to greater than 10 ug/ml. Similarly, in the anti-IIa assay concentration-dependent inhibition of this enzyme was noted with the IC50 of 9 ug/ml. Upon addition of andexanet the IC50 was reduced to greater than 50 ug/ml. In the thrombin generation assays sulodexide produced a pronounced inhibition of thrombin generation with an IC50 of 1.3 ug/ml. Andexanet completely inhibited the effect of sulodexide in this assay. These results indicate that sulodexide produces measurable anticoagulant, antiprotease, and thrombin generation inhibitory effects when directly supplemented to citrated plasma. Andexanet at 100 ug/ml totally neutralised the anticoagulant effects in the APTT and TT assays. Similarly, the thrombin generation inhibitory

effects were completely neutralised. However, in the anti-Xa and anti-IIa amidolytic assay andexanet only partially neutralised the effect of sulodexide. These results suggest that andexanet produces differential neutralisation of sulodexide as measured by different assays and may require further validation.

GENETIC SUSCEPTIBILITY FOR IDIOPATHIC DEEP VENOUS THROMBOSIS

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Objectives: Idiopathic spontaneous lower extremity deep venous thrombosis occurs commonly in young adults, is associated with a higher rate of recurrent thrombosis, and often requires long-term anti-coagulant treatment. Inherited thrombophilia has been diagnosed in about 50% of patients with idiopathic venous thrombosis. Pro-thrombotic genetic polymorphism varies according to ethnic and geographic distribution of the populations. This study aims to evaluate pro-thrombotic genetic anomalies among Lebanese patients with idiopathic deep venous thrombosis.

Material and methods: Between January 2000 and January 2019, 494 patients diagnosed with lower extremity deep venous thrombosis in a tertiary university hospital were retrospectively reviewed. Fifty patients (10.1%) presented with idiopathic venous thrombosis. All these patients were tested for inherited thrombophilia and evaluated for increased plasmatic homocysteine level.

Results: Ages varied between 19 and 87 years (mean: 55.8 years). Twenty-one patients (42%) were less than 50 years old and 13 patients (26%) were over 70 years old. All the patients except one (98%) were carriers for some form of mutation: Heterozygote for factor V-Leiden: 24 (48%), factor VR2 H 1299 R: 2 (4%), factor II: 2 (4%), homozygote for MTHFR C 677 T: 3 (6%), heterozygote for MTHFR C 677 T: 30 (60%), for MTHFR A 1298 C: 17 (34%), and homozygote for B Fibrinogen: 1 (2%). The percentage of heterozygote factor V-Leiden and MTHFR C 677 T mutation among young patients was even higher (61.9% and 14.2%, respectively). Increased homocysteine level was detected among 21 patients (42%). These figures are much higher than those reported in the literature for the general Lebanese population (14.4% for factor V-Leiden and 34.6% for MTHFR C 677 T). The mutant allele was highly expressed among Lebanese patients with idiopathic venous thrombosis.

Conclusions: Screening for inherited thrombophilia among patients with idiopathic venous thrombosis is warranted and should be tailored to accommodate the population risk. It holds the potential for identifying individual patients at high risk for incident and recurrent venous thromboembolism, targeting prophylaxis to those who will benefit most, ultimately reducing the occurrence of venous thromboembolism.

SULODEXIDE (VESSEL DUE F) ACTIVATES GLYCOCALYX RESTORATION IN PATIENTS WITH CHRONIC VENOUS DISEASE

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Objectives: The aim of the study was to evaluate the changes in glycocalyx morphology after a three-month treatment with sulodexide (Vessel Due F) in patients operated on for symptoms of chronic venous disease.

Material and methods: In this pilot study we evaluated three patients treated operatively, in whom signs and symptoms of chronic venous disease had been found. The patients had a bilateral disease staged as CEAP C2 in two cases and C3 in one case. The cause of varicose vein development was reflux in the great saphenous vein (GSV) trunks in both lower extremities from the groin to the one-third upper part of the calf. The patients were referred to endovenous laser ablation of the GSV trunk in the first extremity and consecutively in the second one after a three months. After the first operation the patients started to take sulodexide in a dose of 250 LSU twice a day per os. The treatment lasted 72-100 days. Then the laser ablation of GSV in another leg was performed according to the same technique. The specimen of the vein wall obtained during the first and second procedure of laser ablation was examined. The thickness of glycocalyx was comparatively measured by transmission electron microscope (TEM) model JEM 1010 with a Mega G2 camera. The measurements were performed on specimens contrasted with ruthenium red perpendicularly to cell membranes in several points. Additionally, inflammatory markers like MMP-9, IL-6, and hyaluronan were assessed in umbilical fossa veins, first and second GSV trunk before and after sulodexide intake.

Results: Conducted microscopic measurements of collected vein specimens revealed growth of the glycocalyx thickness after sulodexide treatment. It was observed that no matter how rough the layer of the glycocalyx had been before treatment, it became smooth afterwards. The maximum thickness of glycocalyx ranged between 9.47 and 19.43 nm before and 24.85 and 28.45 nm after the treatment, respectively.

Conclusions: This study for the first time demonstrated the distinct changes in endothelial glycocalyx of the refluxing GSV trunks in patients with chronic venous disease after the treatment of sulodexide (Vessel Due F). The growth of the outer protective layer of the endothelial vein cells is supposed to be explained by the fact that sulodexide components are used to restore the outer layer of glycocalyx. Thus, the endothelial wall is less prone to disruption and creation of specific inflammatory reaction.

THE INFLUENCE OF IVUS-DETECTED NON-THROMBOTIC INFERIOR VENA CAVA AND ILIAC VEIN LESIONS ON THE ACTIVATION OF HAEMOSTASIS AND DYNAMICS OF COAGULATION AND PHYSICAL PROPERTIES OF THE CLOT IN PATIENTS WITH UNILATERAL PRIMARY VARICOSE VEINS

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Objectives: Non-thrombotic iliac vein lesions (NIVL) are common and often asymptomatic. In theory, a significant venous obstructive lesion would lead to activation of coagulation and fibrinolysis. The purpose of the study was to analyse the association between activation of fibrinolysis and coagulation and NIVL in patients with non-complicated primary unilateral varicose veins.

Material and methods: After approval by the institutional Bioethical Committee an observational study was carried out. Twenty-four consecutive patients with unilateral primary varicose veins (PVV) combined with great saphenous vein (GSV) incompetence scheduled for varicose vein surgery were invited to participate in the study. There were 20 (83.3%) women. The median age was 47 (36-59) years, and mean body mass index was 25.7 (24.2-27.8). In 16 (67%) patients varicose veins were present on the right side. All patients were classified as C2 according to the clinical part of CEAP classification. During the varicose vein surgery inferior vena cava and iliac and common femoral veins on both sides were interrogated with intravascular ultrasound with Visions PV 0.035 catheters. The morphological analysis IVC and iliac veins was performed with the Volcano s5 Imaging System (Volcano Corporation, Rancho Cordova, CA, USA). The prevalence of NIVL in patients with PVV was investigated. Left and right common iliac veins (CIV) and external iliac veins (EIV) were analysed. Venous blood was collected into 3-ml tubes anticoagulated with citrate (S-Monovette®, Sarstedt, Numbrecht, Germany). Classical markers of haemostatic activation: thrombin time (TT), fibrinogen, d-dimers (DD), euglobulin clot lysis time (ECLT), plasminogen activator inhibitor (PAI-1), and plasmin-alpha-2-antiplasmin (PAP) complexes were measured as well as thromboelastometry (TEM). TEM was performed with the ROTEM whole blood analyser (Rotem delta, Pentapharm GmbH). The influence of NIVL on the activation of haemostasis was analysed.

Results: The procedure was carried out in all patients according to the study protocol without complications. There was no statistically significant influence of score of stenosis of IVC, LCIV, LEIV, RCIV,

and REIV on the levels of examined markers of haemostatic activation. There was a statistically significant influence of RCIV stenosis score on CFT, angle α, and MCF in the EXTEM test. The values of angle α and MCF were increasing and the value of CFT was decreasing, starting from score 1. Also, a statistically significant influence of stenosis score of IVC and REIV on LI in INTEM test was observed; there was a decreasing trend of LI with the increasing score of stenosis. No other statistically significant associations between stenosis score of interrogated veins and remaining parameters of ROTEM were observed. There was no statistically significant association between the stenosis of IVC, LCIV, and LEIV and values of ROTEM parameters. However, the stenosis of RCIV had a statistically significant influence on the CFT, angle α, and MCF in EXTEM test and CFT in the INTEM test.

Conclusions: To the best of our knowledge, this the first study seeking the association between IVUS-detected, asymptomatic non-thrombotic ilio-caval lesions and activation of haemostasis.

A FACTOR XA INHIBITOR ANTIDOTE (ANDEXANET ALFA) IS CAPABLE OF NEUTRALISING THE ANTICOAGULANT EFFECTS OF UNFRACTIONATED HEPARIN OF BOVINE, OVINE, AND PORCINE ORIGIN IN A COMPARABLE MANNER AS PROTAMINE SULPHATE

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[2]North Shore University Health Systems, Evanston, Illinois, USA

Objectives: Andexanet alfa is an approved antidote for such factor Xa inhibitors as apixaban and rivaroxaban. Unfractionated heparin (UFH) is commonly used for therapeutic, interventional, and surgical indications. Protamine sulphate is commonly used to neutralise UFH. The purpose of this study was to investigate the comparative neutralisation profiles of andexanet alfa and protamine sulphate for heparins of bovine, ovine, and porcine origin.

Material and methods: Powdered forms of heparins of bovine, ovine, and porcine origin were obtained from commercial vendors. Andexanet alfa was obtained from the hospital pharmacy. Powdered protamine sulphate (USP grade) was reconstituted at 1.0 mg/ml. Each of the bovine, ovine, and porcine heparins was supplemented to plasma over a concentration range of 0-10 ug/ml. The effect of protamine sulphate at 10 ug/ml and andexanet-alfa at 100 ug/ml was studied in the aPTT, anti-Xa, and anti-IIa assays. The neutralisation effect of andexanet-alfa (100 ug/ml) and protamine sulphate (25 ug/ml) was also studied in whole blood employing ACT assay at concentrations of heparins at 25 ug/ml

Results: Both andexanet-alfa (100 ug/ml) and protamine sulphate (10 ug/ml) completely neutralised the anticoagulant effects of all three heparins in the aPTT assay. However, protamine sulphate was more effective in neutralising the amidolytic anti-Xa and anti-IIa effects in comparison to andexanet-alfa. In the whole blood ACT, all three heparins produced a strong anti-coagulant effect (400-450 seconds) in comparison to saline (130-150 seconds). Both Andexanet-alfa and protamine sulphate almost completely neutralised the anti-coagulant effects of heparins (140-160 seconds).

Conclusions: These results clearly suggest that andexanet-alfa is effective in neutralising both the therapeutic and surgical/interventional concentrations of heparins in in-vitro settings. While differences in the anti-Xa and anti-IIa effects between heparins are noted, the anti-coagulant effect of these agents in the aPTT assay were comparable, and a similar neutralisation profile was observed in the ACT assays by both agents.

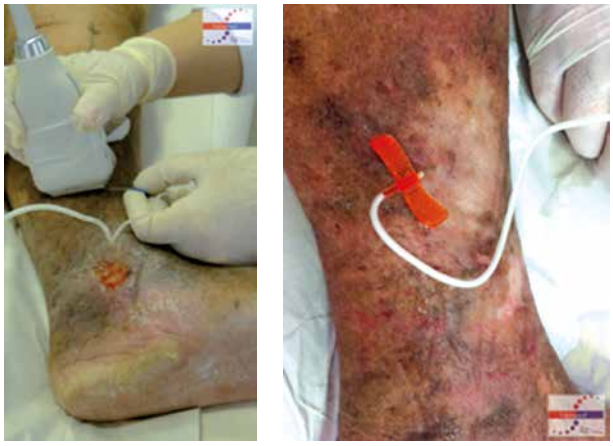
MICROFOAM SCLEROTHERAPY IN RECURRENT VARICOSE VEINS FOLLOWING SURGERY

Solange Seguro Meyge Evangelista, Leonardo Paolinelles, Juliana Lopes, Cristovam Galli, Luis Cardoso, Tatiana Oliveira, Camilo Britto, Junia Pedras

Varizemed Private Clinic, Belo Horizonte, Minas Gerais, Brazil

What has been the acceptance of this treatment by patients in Brazil and what conclusions can we come to?

Fifteen years ago, when I, among others, started using foam sclerotherapy in Brazil, vascular surgeons as well as patients looked at it with mistrust, and it was not well accepted. However, patients with recurrent varicose veins looking for alternative treatment made it easier for me to introduce this technique. In the past decade in Brazil, we have been witnessing a move away from surgery as patients seek other, less invasive, and more effective courses of action. Despite advances in the treatment and disease investigation, such as with ultrasonography, recurrence rates following varicose vein treatment remain relatively high, even today. The prevention and treatment of recurrent varicose veins requires special attention. Varicose vein disease is characterised by a persistent tendency to recur. Even patients operated with success do to disease progression. We should say this to the patients. Repeated intervention is associated with reduced patient satisfaction, whose expectations are very high. The patient is frustrated by a treatment considered to be incomplete, no matter how good the surgical results, and is reluctant to undergo a new intervention. We will present our experience in microfoam sclerotherapy in recurrent varicose veins after surgery. The pattern of reflux feeding the recurrence that we have found. The advantages: it reaches regions where the scalpel does not or where it is difficult to introduce fibre or a catheter. This method best meets the requirements of the specific RVV characteristics. It is easier to repeat, and we can develop tactics based on haemodynamic strategy between the injection sessions. We know that none of the new techniques can cure this disease, but that sclerotherapy with microfoam presents some advantages in relation to re-performing surgery.



Figs. 1 and 2. Foam in C6. LIpodermatoesclerosis. Foam sclerotherapy

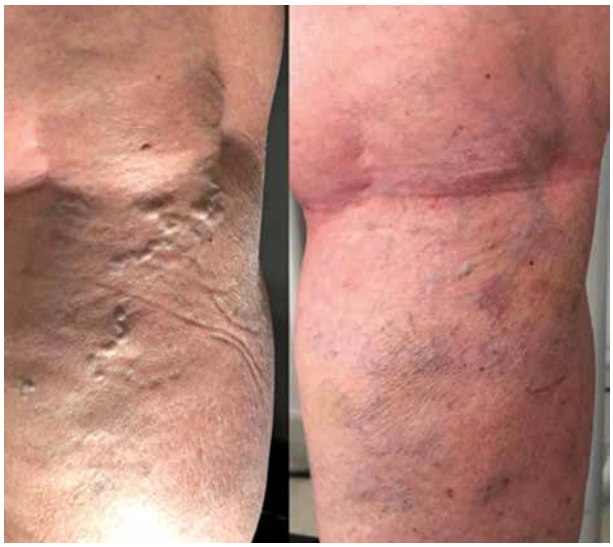


Fig. 3. Three previous surgery. One week after one session of sclerotherapy

PANAMERICAN USFG ESCLEROTHERAPY CONSENSUS

Sergio Garbaz[1], Daniel Onorati[2], Victor Canata[3], Fernanda Bigliani[4], Claudia Aroca[5]

[1]Medical Director of the Fundacion Flebologica Argentina
[2]President of the Argentinian Society of Phlebology and Lymphology.
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Every day more specialists perform treatment in venous insufficiencies of large vessels with foam under ultrasound control but with different modalities. This led us to develop the first Argentine Ultrasound Foam-Guided Sclerotherapy Consensus with the aim of knowing all the variants that currently exist among the specialists who perform such therapy, and to carry out recommendations of practical application that can serve as a guide for all professionals. We have summoned outstanding professionals from Argentina and Latin America plus renowned European experts for the realisation of this Consensus. The main referring professionals in this area were designated by all the phlebology societies of the country. Finally, we formed a group of 25 sclerotherapists and proceeded as follows: 1) A multiple-choice questionnaire was sent online to each participant a few months before the meeting, with 73 questions divided into five chapters (Definitions and Concepts, Material and Methods, Practical Sclerotherapy, Complications – Contradictions, Legal Aspects). 2) 100% of the participants answered all the questions, and the answers were grouped in pie charts and sent back for evaluation. According to the answers, we divided the agenda to be treated in coincidence topics (when one of the answers exceeds 75% of the votes), partial coincidence topics (when the most voted response is between 55 and 75%), and discordance matters (when the most voted option does not reach 55% and the remaining votes are distributed in other alternatives). 3) Each topic of partial coincidence or dissidence will be addressed by two speakers who will have to argue their opposing position very briefly according to their votes in the previous survey. After both dissertations the debate is opened, and the final positions are outlined. Finally, a vote is carried out and the corresponding minutes are signed. All the debates are developed according to the previously subscribed regulation that must be strictly followed by the participants. All sessions will be recorded and filmed during the Consensus, and a final document will be published.

HYALURONAN INJECTION BASED TREATMENT IN PHLEBOLOGY – WHY AND WHEN?

JC Ragg, OR Despa, S Kreis, T Kobilke

Anngioclinic® Vein Centers, Berlin – Munich – Zurich, Germany/Switzerland

Objective: As vein insufficiency frequently goes along with focal or segmental dilatation, the idea to adjust the diameters of such veins or valve zones by injection of perivenous biocompatible gel was established 2013. Although there are lots of medical bulking agents like dextranomer, cellulose derivatives or even acrylates, the best choice for use in phlebology seemed to be cross-linked hyaluronan. There are currently three pilot studies: 1) percutaneous valvuloplasty (PVP), aiming at restoration of local valve function; 2) focal venoplasty (FVP), aiming at diameter reduction to modify hemodynamics, and 3) segmental venoplasty (SVP) to reduce diameters as an adjunct to endoluminal procedures.

Material and methods: PVP was studied in 38 patients (24 f, 14 m, 25-56 y., GSM valves, diameter 7.0-12.2 mm), using a 24 mg/l prototype hyaluronan. FVP was evaluated in 22 patients (13 f, 9 m, 26-69 y.) for reflux reduction in GSV, SSV or tributary insufficiency (also 24 mg/l). SVP was investigated in 40 cases (23 f, 17 m, 41-72 yrs.) with GSV or SSV insufficiency > 8 mm in diameter adjunctive to Biomatrix sclerofoam (Venartis), using a less viscous and less durable hyaluronan (16 mg/l, half-life 8 weeks). For this collective, target segments were split and randomized versus NaCl 0.09%.

Results: PVP established orthograde flow in 37/38 cases (97.4%). With FVP, 18/22 cases were successful (81.8%) in obtaining alternate (n = 10) or orthograde flow (n = 8), correlating well with clinical improvement. In both applications, medical benefit was unchanged at 6 months FU. With SVP, technical success (> 50% lumen reduction) was obtained in all cases (40/40). In all hyaluronan compressed segments, there was no postinterventional pain or discomfort (FU 8 weeks), compared to 36/40 (90%) of saline covered segments. All hyaluronan applications were without adverse reactions.

Conclusions: PVP is effective and safe to restore valve function, best suitable for early stages of pressure-induced valve decompensation. FVP for hemodynamic purposes showed feasibility, effectivity and safety, very promising to create novel "no-cut" vein sparing modalities. SVP adjunctive to endovenous ablation significantly improved post-treatment comfort. Hyaluronan, due to its approved biocompatibility and low-risk placement, will be mandatory. All modalities are now waiting for the manufacturers to provide reasonable products.

MICROFOAM SCLEROTHERAPY IN RECURRENT VARICOSE VEINS FOLLOWING SURGERY

Solange Seguro Meyge Evangelista, Paolinelles L, Lopes J, Galli Cristovam, Cardoso L, Oliveira T, Britto C, Pedras J

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What has been the acceptance of this treatment by patients in Brazil and what conclusion can we come to? 15 years ago, when I, among others, started using foam sclerotherapy in Brasil, vascular surgeons as well as patients looked at it with mistrust and it was not well accepted. However, patients with recurrent varicose veins looking for alternative treatment made it easier for me to introduce this technique. In the past decade in Brazil, we have been witnessing a move away from surgery as patients seek other, less invasive and more effective courses of action. Despite advances in the treatment and disease investigation, such as with ultrasonography, recurrence rates, following varicose vein treatment remains relatively high, even today. The prevention and treatment of recurrent varicose veins requires special attention. Varicose vein disease is characterized by persistent tendency to recur. Even patients operated with success do to disease progression. We should tell this to the patients. Repeated intervention is associated with reduced patient satisfaction; whose expectations are very high. The patient is frustrated by a treatment considered to be incomplete, no matter how good the surgical results, and is reluctant to undergo a new intervention. We will present our experience in microfoam sclerotherapy in recurrent varicose veins after surgery. The pattern of reflux feeding the recurrence that we have found. The advantages: reaches regions where the scalpel does not or where it is difficult to introduce fiber or a catheter.This method best meets the requirements of the specific RVV characteristics. Easier to repeat, we can develop tactics based on hemodynamic strategy between the injection sessions. We know that none of the new techniques can cure this disease, but that sclerotherapy with microfoam presents some advantages in relation to redo surgery.

e-poster number 1

ENDOVENOUS LASER ABLATION FOR GIACOMINI VEIN REFLUX

Luiz Albernaz, Daiane Albernaz, Lucia Deibler
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Objectives: Giacomini vein (GV) incompetence is a very well-known source of reflux in patients with varicose veins. Its therapeutic approach is still controversial. Conventional surgical treatment at this site is often difficult and has increased morbidity. On the other hand, echo-foam is not free of complications and the possibility of recanalisation in the medium and long term must be considered. Endovenous ablation of GV might become a safe and effective method for treatment. The aim of this study was to evaluate the safety, effectiveness, and rate of complications and venous occlusion in patients undergoing ablation with a GV endolaser.

Material and methods: Data were collected from 34 patients (36 legs) in the period from 2013 to 2018. The patients were treated by 1470-nm endolaser with energy j/cm. We analysed the diameter of the treated vein, reflux extension, CEAP, Aberdeen score, and VCSS. We had no cases of skin burning, infection, hyperchromia, or VTE. The mean length of analgesic treatment was 5.2 days (standard deviation 3.7 days). One patient submitted to GV ablation GVA associated with phlebectomies at the popliteal region presenting paraesthesia, but the symptoms did not last more than 90 days. The relationships between these variables and the complications presented were correlated.

Results: We evaluated 37 patients, 85.3 of them female. Thirty-nine percent were on the right side and 43.9% on the left side. The mean distance was 19.9 cm (standard deviation of 10.6 cm). The mean LEED was 65.0 j/cm with a standard deviation of 21.9 cm. Paresthesia 6 (14.6%), no hyperchromia and all closed in 3 months. The median time to analgesics was 8 days. Ten patients reported pain at the 90-day review (31.3%). We found significant drop in VCSS ($p < 0.001$). Mean CEAP pre-treatment was 2.4 points (standard deviation 0.5 points). we havent found relationship between post treatment pain and LEED ($p = 0.872$). There was no differences between the presence of paresthesia and greater LEED ($p = 0.115$) neither great distance treated ($p = 0.505$). The difference between the analgesic intake time and LEED was at the limit of statistical significance ($r = 0.53$; $p = 0.050$).

Conclusion: In this series, endovenous laser ablation was safe and effective for treatment of Giacomini vein insufficiency.

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e-poster number 2

RESULTS OF THE ABLATION OF *VENA SAPHENA PARVA* WITH ENDOLASER – A SERIES OF CASES

Luiz Albernaz, Daiane Albernaz, Fernanda Zignani
Albernaz Clinic, Novo Hamburgo, Brazil

Objectives: Small saphenous vein (SSV) incompetence affects about 15-20% of patients with varicose veins. Conventional surgical treatment is associated with a high risk of nerve damage and increased morbidity, while echo-foam is associated with higher rates of recanalisation in the medium and long term. Endovascular ablation of SSV is a safe and effective method, and it is indicated by guidelines for the treatment of incompetent saphenous axis with a strong degree of evidence. The aim of this study was to evaluate the safety, effectiveness, and rate of complications and venous occlusion in patients undergoing ablation with an SSV endolaser.

Material and methods: This was a prospective cohort study of 175 patients submitted to echogenic endovascular ablation of SSV with a 1470-nm endolaser diode within a five-year period at the Albernaz Clinic in Brazil. The patients were followed by clinical and ultrasound evaluation at seven days, one month, and three months. Data analysis was performed with the statistical package SPSS version 20.0 and with the spreadsheet Microsoft Excel 2010.

Results and conclusions: Data were collected from 175 patients: 34 males and 141 females. The mean SSV diameter was 4.0 mm. The mean age was 51.2 years. The mean length of the treated vein segment was 18.3 cm (SD 8.3). The mean LEED was 83.4 J/cm (SD 33.3). Twenty-three subjects (13.7% of the 168) had paraesthesia. The vein occlusion rate was 100% (162 patients). The mean number of days of analgetic drug use was 5.2 (SD 3.7 days). Thirty-one patients (18.8%) reported pain. The average preoperative Aberdeen score was 18.4 points, and in the postoperative period it was 9.4. The median VCSS preoperatively was 4 points (interquartile range 3 to 6). Regarding the data in the postoperative period, the median VCSS was 1 (interquartile range 0 to 2 points). The majority of the patients were class C2 (85 patients – 59.4%), 38 patients were class C3 (26.6%). According to the statistical analysis, the average length of the treated vein in the subjects with and without paraesthesia was similar. There was also no higher LEED reported ($p = 0.643$). There was no correlation between paraesthesia and CPAP class ($p = 0.252$), nor with Aberdeen score in the preoperative assessment ($p = 0.691$), nor with VCSS preoperatively ($p = 0.751$). Among the subjects who used analgesics for a few days, there was no correlation between the number of days and other variables. There was no difference between the patients who reported pain and those who reported no pain in relation to vein diameter; $p = 0.379$ for the mean of the two limbs. The mean extension of the treated vein did not differ between patients with and without pain ($p = 0.667$ for the right, $p = 0.873$ for the left, and $p = 0.774$ for the mean of the two limbs). There was also no difference between patients with and without pain compared to LEED used ($p = 0.089$) for the mean of both limbs. There was no association between pain and CPAP class ($p = 0.330$) or VCSS or Aberdeen score in the preoperative evaluation ($p = 0.559$ and $p = 0.522$, respectively).

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e-poster number 3

ALTERNATIVE CALCULATION OF THE REQUIRED LINEAR ENDOVENOUS ENERGY DENSITY (LEED) UNDER ENDOVENOUS LASER ABLATION (EVLA)

Dmitrii Alekseev, Fatima Tekeeva, Aigul Kubanychbek Kyzy
Center of Phlebology, Bishkek, Kyrgyzstan

Objectives: Currently the EVLA method is widely used to treat varicose lower extremity veins. The use of the "water" lasers with a wavelength of 1470-1560 nm and radial fibres has led to a large proportion of positive results (96-97%) and a low rate of recurrence (2-4%). Currently discussions are being conducted about the selection of optimal power and overall energy to ensure the greatest success. During operations we identified the different values of wall thickness. This conclusion was made by us on the basis of differences in the vein diameter after infiltration anaesthesia with the same initial values of vein diameter before the operation. We believe that these differences can cause deviations in the EVLA results and can lead to unsuccessful cases and varicose vein recurrence.

Material and methods: The results of treatment of 1524 patients who had undergone the ELVA of 2126 main trunks of saphenous veins were used in the work. The operation was performed using a Biolitec device (Leonardo 45 dual, Ceralas E 45). Biolitec radial fibres (Elves Radial 2 ring, Elves Radial 2 ring slim) were used during the operation. Fibre extraction was performed using a Pulback device (Biolitec) with the ability to change the speed (0.5, 1, and 1.5 mm/s). Infiltration anaesthesia utilised a Noavag DP 30 pump. Energy control on the optical fibre was carried out by Ophir StarLine (sensor diameter 65 mm). The patients were divided into two groups. The main groups and subgroups were comparable in terms of sex, age, and initial parameters of varicose veins (anatomical pool, number of stems involved, vein diameter). The vein diameter ranged from 4 to 20 mm. The subostial ectasia value was from 10 to 40 mm. The first (control) group included 508 patients. When performing EVLA the energy calculation was made for this group of patients at the rate of 7 J per millimetre of vein diameter. The energy calculation was made for the second group (1016 patients) using a formula developed by us. The calculation took into account not only the initial vein diameter but also the vain wall thickness.

Results: The results obtained in the first group were as follows: Based on EVLA of 708 stems from 508 patients, varicose vein recurrence requiring re-intervention was observed in eight patients (1.6%) at up to two years. There was no recurrence in the second group (1016 patients – EVLA of 1418 stems). The success rate was 100%. According to our calculations, the vein wall thickness ranged from 0.15 mm to 0.32 mm.

Conclusions: The use of not only the initial parameters, but also the probable wall thickness indices, in the calculation enables improvement

of the EVLT results and reduction of the number of varicose vein recurrences. We believe that high energy (Elves Radial 2 ring > 9 W, Elves Radial 2 ring slim > 7 W) should not be used because it may lead to the risk of optical fibre carbonisation and overheating. If an energy increase is required, a decrease in the extraction rate should be used (0.5, 1 mm/s).

e-poster number 4

MANAGEMENT OF VARICOSE VEINS WITH MICROCURRENTS

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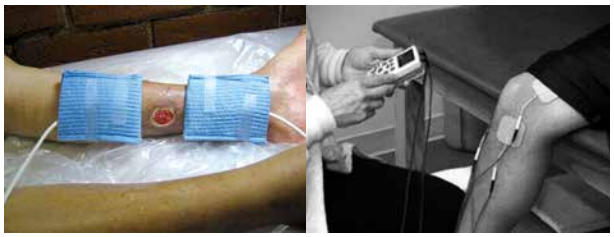
[1]Arias Medical Clinic International, Xalapa, Mexico
[2]Scientific Institute of Higher Education México, Xalapa, Mexico

Objectives: One of the studies to document the positive effects of microcurrents in wound healing was that of Wolcott *et al.* in 1969. They applied 200 to 800 microamperes in a wide variety of wounds. The group treated with microcurrent showed an acceleration of 200% to 350% in the process of wound healing and greater extensibility in the scar tissue, in addition to antibacterial effects in the infected wounds.

What are microcurrents?

A microcurrent is a low voltage current with symmetrical biphasic waveform. Pulsed stimulation in microamperes (intensity). It consists of the introduction of an electric current through the skin, which is similar to the current generated by the body. It is characterised by having a very low intensity (0-1000 Hz) and an insufficient load to excite the peripheral nerve fibres. They are dosed at the subsensory, submitious, or subliminal level with rapid responses that work similarly to the bioendogenic electricity of the body (0.2 Hz).

Cellular activation



The application of a microcurrent with different types of waves and frequencies prepares the skin tissue to facilitate cellular permeability. This microcurrent acts on the dermis, promoting nutrient exchanges and favouring the synthesis of collagen, elastin, and reticular fibres, accelerating regeneration cells, activating the venous-lymphatic system, and eliminating the residues of cellular metabolism. The energy is delivered on the same scale of values as the current produced by the organism at the level of each cell (with an approximate ratio of 300 microamperes per square centimetre). For this reason, it is said that the treatment with microcurrent provides a physiological contribution at the cellular level.

Current components

Positive phase: repair current. Negative phase: bactericidal current. The biphasic wave has a positive phase and a negative phase, sterilising the wound and promoting its repair.

Material and methods: At the Arias Medical Clinic we submitted 30 patients with varicose ulcers, divided into two groups. One of the groups was treated traditionally, and the other group was treated with microcurrents in the range 300-700 μA. The group treated with microcurrents received a session of 30 minutes of stimulation every third day. Plate electrodes were used for the application. The electrodes were placed on the edge of the ulcer.

Results: After eight weeks of treatment, the microcurrent treated group showed a 150-250% acceleration in the healing process, as shown by the following: 1) better formed scars; 2) decreased pain; 3) decreased infection in the treated area.

Conclusions: The use of microcurrents favours the repair of tissues in varicose ulcers, decreasing the healing time, reducing pain, and increasing protein synthesis. It stimulates the regeneration of damaged tissue and inhibits infectious processes, as well as the following: 1) it increases mitochondrial ATP by up to 500%; 2) it stimulates the SNA; 3) it stimulates the lymphatic flow and inhibits the activation points. The use of microcurrents has been proven to be a primordial tool for the treatment of varicose ulcers.

e-poster number 5

THE LARGEST MASSIVELY THROMBOSED VARICOSE VEINS EVER REPORTED

Harinder Singh Bedi
Shalby Hospital, Mohali, Punjab, India

Objectives: Varicose veins, if not treated at the appropriate time, can land up in lead to complications like bleeding, thrombosis, deep vein thrombosis (DVT), and pulmonary embolism. We report a massively thrombosed varix of the great saphenous vein (GSV).

Case report: A 52-year-old man with a history of left-sided varicose veins for the past 20 years presented with severe pain and an increase in varicose vein size. The GSV was visibly and massively dilated, firm to hard, and tender. Clotted blood could be felt in the varix in the calf and thigh. He was started on anti-inflammatory medication and LMWH. A Duplex and CT venogram showed gross reflux of the saphenofemoral junction (SFJ) and of a perforator in the calf, along with massively dilated (5.5 cm) and thrombosed varicosity. There was a risk of pulmonary embolism. The patient was taken up for open surgery. After proximal and distal control, the SFJ was disconnected. All the varicosity with the thrombosis was excised and the perforator ligated. All the thrombosed varix was removed. The patient was discharged on the second day and remained in good condition.

Conclusions: Varicose veins should be treated at an appropriate time before the advent of complications. This report is of one of the largest varicosities ever reported.

e-poster number 6

A COMPARATIVE ANALYSIS OF THE EARLY POSTOPERATIVE PERIOD IN PATIENTS AFTER PHLEBECTOMY AND THERMOABLATION INTERVENTIONS DUE TO VARICOSE VEIN DISEASE

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Objectives: The assessment of the early postoperative period in three groups of patients who underwent phlebectomy, radiofrequency ablation (RFA) and endovasal laser coagulation (EVLC) in the varicose vein disease treatment.

Material and methods: The study design was retrospective. In total, 455 patients with lower limb varicose vein disease in the great saphenous vein (GSV) system and with C2-C3 (CEAP) classes were studied. The patients were divided into three groups: first group (n = 154) – crossectomy + GSV stripping in the thigh + the removal of varicose veins (VV); second group (n = 151) – EVLC of GSV + sclerotherapy (ST) of VV; third group (n = 150) – RFA GSV + ST of VV. Evaluation of the postoperative period (from two days to two months) was carried out in all three groups. A random sample of 30 patients in each group was selected for evaluation. The severity of pain according to VAS evaluation during the week after the intervention, patient satisfaction with surgery according to the Darvall questionnaire, and the number of days of disability and return to normal work were studied. Statistical processing was performed using Excel for Windows XP and MedCalc® (version 11.4.2.0., Mariakerke, Belgium).

Results: The evaluation of the level of postoperative pain according to the VAS scale is given in the table.

Pain after stripping in the first two days was significantly more pronounced than after the use of thermal ablation techniques, and it lasted longer (up to four days). The duration of administration of analgesics in group 1 was four days; in groups 2 and 3 it did not exceed two days. The need for non-steroid anti-inflammatory drugs was in group 1 – 71.4%; in group 2 – 56.9%, and in group 3 – 62%. The average number of days

of disability in group 1 was 21, and a full return to normal work took place after an average of 35-40 days. In groups 2 and 3 the average number of days of incapacity for work was seven, with a full return to ordinary work after 14 days. Satisfaction level (according to the Darvall questionnaire) did not vary between groups.

Group	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1 (*n* = 30)	5.2 ±0.8*	5.1 ±0.7*	3.3 ±0.9*	2.1 ±0.4*	0	0
2 (*n* = 30)	4.1 ±0.8	3.1 ±0.7**	0	0	0	0
3 (*n* = 30)	3.8 ±0.8	2.1 ±0.7	0	0	0	0

*Note: *p < 0.02, between the first group and the second and third group; **p < 0.05, between the second and third group.*

Conclusions: The postoperative period after performing thermoablation techniques for varicose vein disease of the lower extremities proceeds more easily and is significantly shortened compared with that after phlebectomy.

e-poster number 7

EVLT – DO WE STILL NEED SURGERY?

Victor Canata, Jose Esquivel

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Objectives: Paraguay, a country with tropical temperatures, has a high incidence of vein problems. The principal objective of this study was to demonstrate the effectiveness and security of the treatment as well as the personal experience in our surgical practice in the endovenous laser ablation (ELA) of the saphenous vein and its collateral branches, from March 2009 to March 2017.

Material and methods: A total of 2173 endolaser treatments in 1974 patients with incompetent GSV, SSV, perforating veins, and anterior lateral branch of the saphenous vein, using a 1470 diode laser energy (E. luminar) were analysed. Vein access was achieved by percutaneous needle or stab-wound/Mueller-hook approach. Local tumescent perivenous anaesthesia with Klein solution was delivered under ultrasound guidance. A current of 2-7 W was applied along the GSV starting at 1 cm of the SFJ; laser energy was delivered using an 800-µm fibre pulse duration with pullback every 2 mm, with pulses of 1 s, and with no inguinal access.

Results: Immediate collapse of the SFV or SSV was observed after the procedure, and occlusions were observed in 98% of treated veins after four years of follow-up. Patients were instructed to resume daily activity and to wear stockings for one week. In 15 cases, at the weekly follow-up we found partial recanalisation and we re-operated with the application of higher laser energy. Minimal skin burns, ecchymosis, and paraesthesia were observed. No DVT or severe complications were observed.

Conclusions: ELA is a minimally invasive, ambulatory, outpatient treatment for the reflux of the GSV and branches, with results comparable or superior to surgical treatment. The method is safe, easy to perform, well tolerated, without requirement of general or regional anaesthesia, and with higher rates of acceptation than surgery. However, despite the above-mentioned advantages of the laser treatment, we still think that surgery is the best option for treatment of the saphenous vein.

e-poster number 8

ANAPHYLAXIS DURING ENDOVENOUS LASER ABLATION

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I report the case of a 39-year-old man who developed an anaphylaxis during endovenous laser ablation (EVLA). Venous ultrasound of his right leg showed varicosity of the great saphenous vein. The patient was scheduled for EVLA. He had no history of allergies. After arriving in the operation room, electrocardiography, heart rate, non-invasive blood pressure, and oxygen saturation were monitored. He received ceftezole and tobramycin for surgical prophylaxis, and nasal oxygen was applied. A laser fibre was inserted into the right great saphenous vein. Sedation was induced with intravenous propofol 70 mg. After confirming the patient's loss of consciousness, tumescent solution without epinephrine infiltration was started. Propofol 5 mg was injected every 30 seconds during the procedure. Within minutes, the patient coughed suddenly. Subsequently his heart rate was increased to 120 beats/min and oxygen saturation was decreased to 85%. Suspecting the influence of propofol, the injection was stopped, and after waiting for a minute the oxygen saturation did not increase. We were unable to measure the patient's blood pressure. Assisted ventilation was started with a bag valve mask. The patient was placed in Trendelenburg's position. An 18-gauge catheter was inserted in another peripheral vein for volume loading. His blood pressure rose to 65/40 mm Hg during volume expansion. When the patient was awake, he reported abdominal pain and nausea. He perspired profusely but hives were not present. On auscultation, lung sound was clear. Twenty minutes elapsed before the ambulance arrived. His blood pressure rose to 75/55 mm Hg and his heart rate decreased to 100 beats/min, but oxygen saturation remained around 85%. He vomited gastric juice and erythema appeared on his face. He was transported to the emergency department of a university hospital. On the way to the hospital, volume loading with crystalloids was continued. Oxygen saturation recovered to 95%. After arriving at the emergency department, he vomited gastric juice again. Antihistamine was administered intravenously. Blood pressure rose to 115/75 mm Hg and heart rate decreased to 85 beats/min. But oxygen saturation decreased to 90%. The hives continued to progress and he reported tightness around his eyelids. Epinephrine 0.3 mg was administered in the upper outer thigh, and a steroid was administered intravenously. Subsequently, erythema began to regress. Several hours later, as the haemodynamics improved and symptoms subsided. The patient was discharged with oral medicines. Propofol was suspected as the most likely cause of the anaphylaxis, but the other medicines could not be ruled out.

e-poster number 9

OUTCOMES OF OLDER PATIENTS AFTER AMBULATORY HIGH LIGATION AND STRIPPING FOR VARICOSE VEINS: A PROSPECTIVE COHORT STUDY

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Objectives: To compare the safety and efficacy of HLS in ambulatory care for a 60-years-old-and-under group and an over-60-years-old group.

Material and methods: This was a prospective cohort study including 170 patients who underwent HLS in ambulatory centre for varicose veins from November 2016 to October 2017 in West China Hospital. We compared the differences of Clinical, Etiological, Anatomical, and Pathophysiological (CEAP) classification, Venous Clinical Severity Score (VCSS), Visual Analogue Score (VAS), Aberdeen Varicose Vein Questionnaire (AVVQ), Quality of Recovery (QoR-15), and postoperative complications between patients 60 years old and younger and patients over the age of 60 years.

Results: A total of 170 patients (236 limbs) were included in our research, which included 126 patients in the 60-and-under group and 44 patients in the over-60 group. At six weeks and six months post-surgery there were no statistically significant differences in CEAP, VCSS, VAS, AVVQ, QoR-15A, and postoperative complications between the two groups (all p values > 0.05), with the one exception being at six months post-surgery, when the QoR-15B score for the 60-and-under group was higher: $p = 0.012$, (OR = 0.892, 95% CI [0.712-1.117]).

Conclusions: HLS can be safely and efficiently performed in patients over 60 years of age in ambulatory settings.

e-poster number 10

PERSONALISED TREATMENT OF PATIENTS WITH VARICOSE VEINS OF THE INFERIOR LIMBS

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Objectives: In our opinion, every patient with varicose veins represents a particular case. There are a few causes leading to the development of varicose disease, which are particular to each case: 1) The special anatomy of the superficial vein network of every inferior limb: two saphenous trunks with a large number of perforator veins and collaterals; a large number of non-saphenous veins with many individual perforator veins; veins that make these superficial veins interconnected – the communicating veins system; a large number of anatomic variants of all these superficial veins. 2) The system of vein valves can be affected (insufficient) at every level of the superficial vein network and can lead to venous reflux on different vein segments, which are sometimes similar but never identical. This leads to the question regarding the nature of treatment of varicose veins: should it be standardised or personalised? In our opinion, only a personalised treatment should be applied. There are two choices: 1) a personalised treatment that includes two or more techniques; and 2) a personalised treatment using a single technique. Of course, it is more difficult to solve every case of varicose disease by using just one procedure. The purpose of this paper is to present a procedure that can treat all varicose veins in just one intervention. The method is called VANST (varices' ambulatory non-stripping surgical therapy).

Material and methods: VANST is a minimally invasive surgical procedure through which the insufficient superficial veins are disconnected from the circuit. The varicose veins are left in place, but they become empty, collapsed, non-functional tubes, and the reflux at their level is eliminated. The steps of the procedure are: 1. Marking on the skin the locations of the future incisions. 2. Surgical treatment: local anaesthesia with 1% lidocaine; incisions of 2-5 mm; the varicose veins (including saphenous trunks) are intercepted, sectioned, and ligated. The same procedure is performed for insufficient perforators. The varicose veins and insufficient perforators are taken out of the circuit. A non-compressive bandage is applied. 3. The patient is immediately mobilised after the operation and leaves the clinic after 30 minutes. 4. Post-operative check-ups (24 hours, seven days, two months, and every six months).

Results: All the varicose veins are resolved during the operation in 100% of the cases. Our experience in using the VANST technique is of more than 13,000 cases. VANST can treat the following: varicose veins of the GSV and of the SSV; varicose veins of non-saphenous origin; giant varicose veins (diameter between 40 and 60 mm); recurrent varicose veins; varices complicated with lipodermatosclerosis and/or leg ulcer; and varicose thrombophlebitis.

Conclusions: 1. VANST is both a radical method, which permanently takes the pathologically dilated superficial veins out of the circuit, and a conservative one, which preserves the patient's normal venous capital. 2. VANST can be compared to the endovenous techniques for the treatment of varicose veins, but it actually proves to be superior in terms of its wide range of applicability.

e-poster number 11

CHALLENGES IN THE MANAGEMENT OF VENOUS DISORDERS IN INDIA

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The Indian sub-continent is known for its rich and multicultural ethnicity, and thus has a wide range of venous disorders, ranging from venous ulcers to venolymphatic malformations. They are peculiar and very different when compared to those described in western literature. For example, the average age of venous ulcer patients is between 35 and 45 years, whereas in the western literature it is seen more in the elderly. The Christian Medical College in Vellore is the largest centre for the management of venous disorders. This presentation will summarise the Indian scenario in the management of venous disorders and focus on the challenges present.

e-poster number 12

CROSSECTOMY AND SCLEROTHERAPY IN THE TREATMENT OF VARICOSE ULCERS

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Considering that crossectomy is a minimally invasive surgical technique together with endovenous chemical ablation with foam, we started a study using these two techniques to reduce venous hypertension, the main cause of varicose ulcers. We analysed the treatment results in a group of 328 patients with venous leg ulcers related to the incompetence of the saphenous vein diagnosed by Doppler US. The group comprised 65% female patients and 35% male patients, with a greater prevalence of the ulcers in the population of 50-54-year-olds and more common presentation in the left leg with (62%) than in the right (37.5%). The healing rate was 35% in six weeks and 45% in seven weeks, and as yet no recurrences have been observed. The conclusions suggest that the combined treatment of chronic venous insufficiency is very useful for the treatment of varicose ulcers, exhibiting an improvement in the quality of life, an average healing time of six to seven weeks regardless of the size of the lesion, and elimination of the pain caused by the ulcer. The total cost of treatment is 850.00 US dollars, and the cost of the material used during surgery is 240.00 US dollars.

e-poster number 13

JOURNEY FROM OPEN TO ENDOVENOUS SURGERY: EXPERIENCE OF A BEGINNER

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Varicose veins were first documented as illustrations on Ebers Papyrus dated 1550 B.C. Although treatment options were described as long as 150 years ago, rapid advancement began only in the last 20 years. Open surgical procedure was the only option in Bangladesh at the start of treatment. Endovenous ablation started only three years ago but did not gain popularity because of lack of awareness, motivation, and cost. We believe that advancement of science occurs with the adoption of newer techniques, and we took this as a challenge. We started EVLT and performed more than 50 cases at a single private setup with a single team. We followed every patient for three months and documented all complications that the patients experienced and managed accordingly. Skin necrosis followed by ulceration was the most challenging complication. With some cases the complications gradually reduced in number. We categorised patients according to CEAP classification. Our patients usually present late, and a large number of patients belong to class C5 and C6. In our experience we managed long and short saphenous system, perforators, and venous ulcers. We followed the internationally accepted guidelines for management and tried to make a protocol of postoperative care suitable for our people. We are also conducting a patient awareness program on a target group of people. Our plan is to adopt other endovenous methods and compere the outcomes. The ultimate aim of our centre is to deliver comprehensive care of veins.

e-poster number 14

EARLY OUTCOMES OF GLUE ABLATION WITH N-BUTYL-2-CYANOACRYLATE FOR THE TREATMENT OF SMALL SAPHENOUS VEIN INSUFFICIENCY: A SINGLE-CENTRE EXPERIENCE

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Objectives: Chronic venous insufficiency (CVI) of the lower limbs is a common disorder, and small saphenous vein (SSV) reflux is responsible for nearly 15% of all varicose vein disease. SSV insufficiency may result in complaints of equal severity to GSV insufficiency. In the literature, studies about treatment options with innovative nonthermal techniques are very limited. We aim to present the early results of a study of the use of novel n-butyl-2 cyanoacrylate-based non-tumescent endovenous ablation for the treatment of patients with SSV insufficiency.

Material and methods: Thirty-two patients with small saphenous vein insufficiency were treated during the past two years in our clinic. The study enrolled adults aged 24-65 years with symptomatic small saphenous vein reflux lasting longer than 0.5 s with vein diameter ≥ 5.5 mm assessed in the standing position. Duplex ultrasound imaging and clinical follow-up were performed on the third day, first month, and sixth month. Clinical, aetiological, anatomical, and pathophysiological classification, and venous clinical severity score were recorded.

Results: Of 32 enrolled patients, 28 were available at the first and sixth month follow-up. Complete occlusion of the treated small saphenous vein was confirmed by duplex ultrasound in all patients perioperatively. Two partial recanalisations were observed at six months of follow-up. The occlusion rate was 92.8% at 12 months. Symptoms, Aberdeen varicose vein questionnaire scores, Venous Clinical Severity Score, and quality of life improved similarly in both groups at 12 months. No clinically significant procedure-related late adverse events occurred.

Conclusions: The risk of neurological damage is a clinically important downside of surgical treatment and thermal ablation techniques. Although the evidence on nonthermal techniques, such as novel n-butyl-2 cyanoacrylate-based ablation in the treatment of SSV insufficiency, is still sparse, this procedure seems to be feasible, safe, and efficient in treating the vast majority of incompetent small saphenous veins.

e-poster number 15

CLINICAL ANALYSIS OF RADIOFREQUENCY ABLATION OF VARICOSE VEINS

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Objectives: To evaluate and analyse the clinical efficacy and outcomes of radiofrequency ablation (RFA) of varicose veins.

Material and methods: This retrospective study contains 113 patients who underwent RFA for varicose veins between 2017 and 2018 in Peking University First Hospital, China. Highly efficient ClosureFast RFA catheters (Medtronic, San Jose, CA, USA) were used in this study. The techniques used for RFA of varicose veins were performed according to the standard procedure. Duplex scans, venous clinical severity scores (VCSSs), and the Aberdeen Varicose Vein Questionnaire (AVVQ) were used to document treatment outcome and patient symptoms before and after the procedures. Treatment outcomes were estimated before the procedure and three months, six months, and 12 months after the procedure. Outcomes were analysed by paired *t* test, chi-square test, or Fisher's exact test as well as by logistical regression.

Results: A total of 113 patients were evaluated for 179 consecutive RFA procedures (179 limbs). The initial technical success was 98.3% (176/179). The estimated mean VCSS changed over time from 5.1 ±1.79 at pre-procedure to 0.7 ±1.03, 0.5 ±1.03, and 0.6 ±1.11 at three months, six months, and 12 months post-procedure, respectively. AVVQ score showed an improvement from 17.1 at baseline to 6.3 at 12 months ($p < 0.0001$). The improved VCSS was maintained one year after the procedure ($p < 0.001$). Recanalisation of the saphenous vein was detected in three limbs at the one-year follow-up.

Conclusions: In this study, RFA of varicose veins had an initial success rate of 98.3% and a significantly improved patient VCSS and AVVQ at 12 months.

e-poster number 16

CASE PRESENTATION OF MISMANAGED EVLA AND WHAT WENT WRONG

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Objectives: Although EVLA is a well-known technique and it has been performed all around the world, mistakes and mismanagements are regular and unfortunately are not presented and reported adequately.

Case report: A patient with venous insufficiency underwent bilateral EVLA of GSV under LA in the clinic. After the procedure, his complaints increased and larger varicose veins started to appear on both legs. The patient returned for a second opinion, and by examining his file and US findings such discrepancies were observed. A stocking two sizes larger was prescribed. The findings of an ultrasound scan performed previously in the 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. The 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.

e-poster number 17

EVLA – HOW WE DO IT IN DUBAI?

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Introduction and Method

Thus, EVLA – endovenous laser ablation (also known as EVLT – endovenous laser treatment) is performed all around the world, but complete vein treatment is a combination of methods and can be performed differently in different places, so it is useful to go into more detail to clarify how similarly or differently all of us are preforming this procedure. Below is a short description of our approach: 1) clinical visit: a) history taking, b) full examination, c) both legs measurement, 20 points; 2) ultrasound Doppler duplex examination: a) semi-standing position on a tilting table, b) room and ultrasound gel are warmed, c) leg augmentation by an assistant, d) every vein including accessory veins are examined throughout their length, e) all the findings and the anatomy are drowned and documented, f) reflux locations are fixed, whether it is a perforator vein or part of a vein, g) 30-45-minute duration, h) 0.5-0.9-second reflux is considered moderate, and only continuous reflux for more than one second is considered severe; 3) mild or moderate reflux: a) a course of medicine for three months, b) compression garment class II as per the required level – AD or AG/Panty, c) lifestyle changes and instruction; 4) severe reflux: a) ELVA unilateral: i) LM heparin before the operation and six days after, ii) LA with mild sedation decided individually, iii) vein puncture, fibre insertion is performed in a tilting position, iv) tumescent anaesthesia concentration and amount: number of veins, weight, sensitivity, v) only defected veins and only the defected parts are treated; b) miniphlebectomy, Varady technique, 2-mm punctures, no stiches, c) compression dressing and class II disposable stocking applied, d) 24 hours - dressing removed, transparent plasters applied, ultrasound control, e) 10th day – dressing removed, ultrasound control, f) 30th day - ultrasound control, g) foam sclerotherapy as a touch-up can be performed: i) operation time, ii) on 24th hour test, iii) 30th day post op; h) compression stocking is used two months post op.

Results: 4-5 hours of hospital time, full mobilisation of the patient after the procedure, no downtime 02-03% currents in the past seven years.

Conclusions: A detailed examination, treatment of all the involved veins, and regular controls and touch-ups are the keys to success.

e-poster number 18

RFITT AND EVLT 1470NM DOUBLE RING – ARE BOTH THE METHODS AS DIFFERENT AS THEIR HEATING SOURCE?

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Objectives: We can choose between radiofrequency or laser systems for endovascular thermal treatment. The system with hot steam is usually not used. The aim of the study is to compare the first generation of radio frequent-induced thermo therapy (RFITT) and endo venous laser treatment EVLT) –1470 nm with double-ring fibres.

Material and methods: RFITT is the system that operates at the lowest temperature of all endovenous thermal systems. A electric current with a frequency of 480 kHz flows between the two poles at the end of a probe. Two probes are used (flexible for stem veins – Celon ProCurve1200-S15, and rigid Celon ProSurge micro 100-T09 for perforators) and a Celon Lab Precision generator. A water-specific laser system with wavelength 1470 nm from Biolitec and two fibres are used for the EVLT – ELVeS Radial 2ring and ELVeS Radial 2ring slim. Both are with a double ring endpiece ensuring the radial emission of photons. Both systems were compared in laboratory conditions using a Flir thermographic camera, simulating the clinical procedure on calf veins with diameter 6 mm. The temperature was measured in the place of thermal energy emission. For RFITT, the generator was set at 18 W, and the movement speed of the probe was 10 cm/min. For EVLT, the generator-power was 10 W and the movement speed of the fibre set in according to the applied energy at 80 J/cm. Both generator setting parameters and the extraction speed were used in the clinical part of the study, too. There were 117 stem veins with diameter 8-12 mm (10 mm mean) in the RFITT group and 123 stem veins with the same parameters in the EVLT group. Then there were 13 perforators with diameter 4 mm in the RFITT group and 14 perforators with the same diameter in the EVLT group. The follow-up for the evaluation of effectiveness was at 24 months. The recanalisation of the vein (complete and partial) was the parameter the effectiveness.

Results: In the experiment, the measured temperatures were between 60°C and 104°C for the RFITT and between 60°C and 142°C for the ELVT. The ProSurge micro probe and ELVeS slim fibre were associated with higher temperatures. A faster temperature increase was observed by EVLT than by RFITT. Carbonisation was observed only on RFITT probes. Complete recanalisation of the treated stem vein was observed in five cases (4.27%) by RFITT and in one case (0.81%) by EVLT, and a partial recanalisation in two cases (1.7%) by RFITT and 0 by EVLT. Perforating veins were reopened in three cases (23.07%) in RFITT group and in one case (7.14%) in the EVLT group.

Conclusions: EVLT is associated with a better effectiveness than RFITT, but the results are comparable. We are convinced that the main role of the different effectivenesses between both systems is played by the faster temperature increase by EVLT interventions and the carbonisation process on RFITT probes.

e-poster number 19

A COMPARATIVE STUDY BETWEEN CONVENTIONAL SURGERY AND RADIOFREQUENCY ABLATION IN THE TREATMENT OF VARICOSE VEINS

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Objectives: Varicose veins are a very common problem all over the world. Surgery has been the gold standard treatment for many years; however, now other less invasive options are available, and they are sometimes more efficient. The aim of the study was to evaluate the radiofrequency ablation (RFA) technique in the treatment of great saphenous vein (GSV) varicosities and to compare the results, clinical outcomes, complications, and recurrence rates after RFA and CS of GSV.

Material and methods: This observational retrospective study included 41 patients with varicose veins, recruited from the General Surgery Department and Vascular Surgery Unit at Ain Shams Hospitals and the Nasser Institute for Research and Treatment.

Results: Operative time was significantly less in CS compared to RFA. One-, six-, and 12-month post-intervention follow-up using clinical examination and duplex imaging were used to assess outcome and detect complications and recurrence rates. No major complications were detected after both techniques; however, minor post-operative complications like paraesthesia and ecchymosis were significantly lower after RFA. Post-operative pain, duration of analgesia use, and time needed to return to normal activity were also significantly lower in the RFA group than in the CS group. Recanalisation of GSV was not detected after radiofrequency manoeuvre nor CS. This study proved that radiofrequency ablation technique is safe and efficient in treating varicose veins; however, long-term results and cost effectiveness need further evaluation.

Conclusions: Conventional surgery has been used for a long time for the treatment of varicose veins with variable degrees of minor to major complications. Duplex-guided radiofrequency ablation is an efficient and a safe modality in the treatment of great saphenous vein varicosities. Of most importance is an adequate duplex scan to identify accessory channels and double superficial systems.

e-poster number 20

STEAM ABLATION FOR SUPERFICIAL VARICOSE VEINS: INITIAL EXPERIENCE

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Objectives: Non-invasive techniques are the latest standard treatment for the management of varicose veins. Thermal ablative techniques like radio frequency (RF) and laser are now gold standard options for the treatment of varicose veins. Steam ablation is one of the thermal techniques that are currently being evaluated for the ablation of varicose veins. Using this method is potentially cheaper than other available modalities because only distilled water is used for the ablation of the veins. We started using this technique one year ago and report our initial results herein.

Material and methods: A total of 37 patients were included, of whom 29 were female and eight were male. Both great saphenous and short saphenous veins were ablated. Tumescent anaesthesia was used. Mean VAS score was 3. Mean diameter of the vein measured at 5 cm distal to SFJ or SPJ was 6.5 mm. Patients were followed up at six days, six weeks, six months, and one year. USG was used to assess closure of the ablated vein and residuals. Foam sclerotherapy was used to treat varicose vein tributaries.

Results: Out of 37 patients 35 had total occlusion at one year (95%). The distal half of the LSV in two patients was found to be partially closed on USG. Both of these patients were early in study, and the veins were opened at first follow-up only. Pain was similar (VAS 3-4) to other thermal ablation techniques reported in the literature.

Conclusions: Steam ablation is another good thermal modality for the ablation of varicose veins. We need to look at the costs of this technique and also look at the long-term results of this method. If the long-term occlusion is similar and it is more cost effective, then it will be a good alternative to laser and RF ablation.

e-poster number 21

HYBRID APPROACH TO AVM: HOW I DO IT

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Objectives: Arterio-venous malformation (AVM) treatment can be very challenging. Various techniques and approaches have been used in the past. We use a hybrid approach to treat AVM, which gives very good results.

Material and methods: Preoperative radiological investigation gives a reasonable indication about planning the treatment. An endovascular approach is used to reach the nidus of the malformation and to embolise

it with ONYX or alcohol. Also, a percutaneous approach is used to stop venous outflow with glue or onyx.

Results: All AVMs that were embolised with the hybrid approach required fewer sittings to completely embolise the AVM compared to only endovascular embolisation. Better closure was seen with the hybrid approach.

Conclusions: A hybrid approach to treat AVMs gives better results.

e-poster number 22

OUR EXPERIENCE WITH THE VENABLOCK AND VEINOFF CYANOACRYLATE EMBOLISATION SYSTEMS

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Objectives: During the past decade endovenous treatment of incompetent saphenous veins has changed radically. As well as the well-known thermal treatment options, the choice was enriched by non-thermal methods such as mechano-chemical ablation and cyanoacrylate (glue) embolisation. These new devices minimise complications such as skin burn, pain, and pigmentation. Furthermore, these techniques do not require tumescent anaesthesia and compressive stockings.

Material and methods: We present a retrospective study conducted from May 2018 to January 2019 in the Centre for Dermatologic Angiology, Prague/Ricany. The inclusion criteria were reflux in great, small, or accessory saphenous veins and patients with vein diameters of 3 to 10 mm. The truncal veins were treated by VenaBlock system and tributary veins by VeinOff system. The follow-up, which consisted of clinical examination and duplex scanning, was performed one week and one year after the procedure. In our study, we focused on occlusion rates and possible postoperative complications.

Results: Fifty-nine patients underwent 65 VenaBlock and 12 VeinOff embolisations. We performed 45 procedures on great saphenous veins, 18 procedures on small saphenous veins, and two procedures on accessory saphenous veins. The occlusion rate was 94% after one year. We did not observe any deep vein thrombosis or pulmonary embolism.

Conclusions: The introduction of the VenaBlock cyanoacrylate embolisation method has brought a new non-tumescent approach in varicose vein treatment. The resulting damage to the venous wall during this procedure is less invasive and severe than in thermal methods. We achieved an occlusion rate of 94% one year after the procedure. We can confirm that, at least in our hands, the VenaBlock and VeinOff systems impress as a successful and safe technique. Major complications were not observed.

e-poster number 23

N-BUTYL-2-CYANOACRYLATE GLUE ABLATION AS A SINGLE-CATHETER PROCEDURE FOR GREAT SAPHENOUS VEIN INSUFFICIENCY TREATMENT: TWO-YEAR FOLLOW-UP

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Objectives: N-butyl-2-cyanoacrylate glue ablation as a single-catheter procedure for great saphenous vein insufficiency treatment is discussed as being superior to thermo-occlusive methods, achieving immediate and permanent vein closure without any side symptoms during the vein regression. Furthermore, no tumescent anaesthesia is required for the procedure. This study aims to present the early results of the use of N-butyl-2-cyanoacrylate glue (VenaBlock, Invamed, Ankara, Turkey) for the treatment of patients with insufficiency of the great saphenous vein and subsequent varicosity of the lower limbs.

Material and methods: Eighty-four patients (63 women, 21 men; 37-72 years old) with great saphenous vein insufficiency and diameters from 5 to 17 mm (mean 7.8 mm), assessed by the ultrasound examination in the standing position, underwent n-butyl-2-cyanoacrylate glue ablation as a single-catheter procedure. The clinical class of the venous insufficiency was from C2 to C5 (CEAP classification), and great saphenous vein reflux was lasting longer than 0.5 s in each of the patients. N-butyl-2 cyanoacrylate non-tumescent endovenous ablation with a guiding light of the great saphenous vein was performed in all of the patients. All patients were treated with low-molecular-weight heparin in prophylactic doses (subcutaneously) for five days following the procedure. There were no external compression devices used after the treatment (neither stockings nor bandages). Two-year clinical follow-up was performed among all of the patients. Duplex-Doppler ultrasound imaging assessments of the veins of the treated limbs were performed in the first, third, sixth, ninth, 12th, 18th, and 24th month after the procedure in each of the patients.

Results: The mean length of the ablation of the insufficient great saphenous vein was 27.3 ±4.2 cm, and the average n-butyl-2 dose delivered was 1.4 ±0.6 ml. The mean procedure time was 8.7 ±3.4 min. There was no deep venous thrombosis, pulmonary embolism, phlebitis, or paraesthesia observed during the whole follow-up period. Procedural success ratio was 90.47%, and complete occlusion of the treated vein was observed in 76 patients during the first month follow-up duplex-Doppler ultrasound assessment. Eight patients with saphenous vein diameters of 12-17 mm had the procedure repeated one month after the previous treatment, with full therapeutic success. Kaplan-Meier analysis yielded an overall clinical recurrence-free rate after a whole two-year follow-up period of 89.28%.

Conclusions: The n-butyl-2-cyanoacrylate-based non-tumescent endovenous ablation with a guiding light appears to be an efficient and safe procedure for the treatment of the insufficiency of the great saphenous vein. It should be considered in future studies to introduce restrictions of the diameter of treated insufficient great saphenous vein. Moreover, the usefulness of the compression therapy introduced after the procedure remains to be assessed. Large-cohort studies and extension of the follow-up period should also be considered when planning future studies.

e-poster number 24

EFFICACY OF MICRONISED PURIFIED FLAVONOID FRACTION (DAFLON®) ON POSTOPERATIVE SYMPTOMS AFTER ENDOVENOUS THERMAL ABLATION: A SINGLE-CENTRE, RANDOMISED, CONTROLLED STUDY

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Objectives: Micronised purified flavonoid fraction (Daflon®) is a venoactive agent with proven positive effects in the treatment of chronic venous disease. The aim of our study was to assess its clinical efficacy in the treatment of postoperative symptoms after endovenous thermal ablation with concomitant phlebectomies.

Material and methods: A total of 120 patients undergoing endovenous thermal ablation (1470 nm laser or radiofrequency) of the great saphenous vein associated with phlebectomies were randomised. Among those, 60 patients received Daflon 500 mg bid seven days before and 30 days after the procedure (Daflon group) and 60 patients did not receive Daflon (control group). Clinical classification (CEAP), 10-cm Visual Analog Scale (VAS) for pain, Venous Clinical Severity Score (VCSS), and Chronic Venous Insufficiency Quality-of-Life Questionnaire (CIVIQ) were used. Assessment visits were performed seven days prior to ablation and seven and 30 days post-ablation. Primary outcome was postoperative pain using the VAS scale and CIVIQ pain score. Secondary outcomes were improvement of VCSS and CIVIQ scores.

Results: Patients' demographics, CEAP classification, type of ablation (EVLA or RF), mean linear endovenous energy density, average vein diameter, and length of ablated vein were comparable between the two groups. Mean preoperative VAS pain score and CIVIQ pain score were 5 and 8.7 in the Daflon group and 5.4 and 9.4 in the control group, while at 30 days there was improvement in both groups (0.2 VAS pain score and 4.5 CIVIQ pain score in the Daflon group vs. 1.1 and 5 in the control group, respectively), ($p < 0.05$). VAS pain score and CIVIQ pain score were statistically lower in the Daflon group at seven days

and 30 days postoperatively ($p < 0.05$). At 30 days postoperatively all patients showed a significant improvement in all domains of CIVIQ and VCSS compared to preoperative assessment ($p < 0.05$), but there were no differences between the two groups.

Conclusions: Daflon in patients undergoing endovenous thermal ablation may improve postoperative pain. Larger studies are needed to confirm these findings.

e-poster number 25

ENDOVENOUS LASER ABLATION WITH A 1940-NM DIODE LASER: EARLY RESULTS

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Objectives: Endovenous laser ablation (EVLA) is an efficient method to treat incompetent great saphenous veins (GSV) with high occlusion rates. In recent years, most of the published EVLA data concern the 1470-nm diode laser. The aim of this study is to demonstrate the treatment outcomes of EVLA of incompetent GSV with a 1940-nm diode laser in an ambulatory setting.

Material and methods: We prospectively evaluated the effectiveness of endovenous laser ablation (EVLA) in a total of 46 great saphenous veins from 43 patients. The patients were assessed and followed by clinical examination and venous duplex ultrasonography. In all patients, laser energy was administered with constant pullback of a two-ring fibre under tumescent anaesthesia. Treatment response was determined anatomically by occlusion of the vein and clinically by the change in the venous clinical severity score (VCSS). Patient satisfaction was assessed and recorded at six-month follow-up.

Results: All patients tolerated EVLA procedure well and were discharged from hospital on the same day as the performed ablation procedure. Treatment response was 100% in 43 patients. The mean length of the measured treated vein segment was 44.5 ±6.3 cm. The average linear endovenous energy density (LEED) was 85.9 (*r*, 65-110) J/cm. The median VCSS decreased from 8 to 2. Postoperative minor complications occurred in three (6.5%) limbs. No severe complications such as deep vein thrombosis occurred. All the patients returned to daily activities within two days.

Conclusions: EVLA of GSV insufficiency with a 1940-nm laser is a safe and effective therapy option with a high success rate.

e-poster number 26

WELDING TECHNOLOGY IN VASCULAR SURGERY

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Objectives: To search for new medical and technological directions in vascular surgery in the framework of the experimental research based on welding of live tissues.

Material and methods: The principle of electric welding of biological tissues is based on the supply of a modulated electric current, which is passed through biological tissue. When a current flows through biological tissues, they heat up, and there is transformation and adhesion of protein structures between each other. The morphology and changes in tissues that were connected by electric welding in the experiment have been studied. During the electric welding of biological tissue, the temperature changes were fixed. The temperature range was from 4°C to 146°C, median 88.4°C. Interference filtering was performed using the noise filter functions and a special low pass FIR filter with a frequency of 20 Hz. From the site of electric welding, fragments of tissues were removed locally and perifocally. Histological studies were performed using an Olympus BX 51 microscope, a digital camera, and Olympus DP-Soft software.

Results: The use of the technology of welding of the arterial wall formed a three-layer seam, morphologically formed from the dense translucent light brown tissue, which was clearly differentiated in the region of the edge of the application of the electrodes to the artery. In the microscopic study, the seam consisted of a homogeneous dense substance formed from strongly interconnected structures of coagulated proteins, which were based on collagen fibres of the artery wall. In the study of the welding zone it was discovered that, due to the combined action of mechanical compression, the passage of a high-frequency current through the tissue, and the temperature effect, a weld seam was formed. It consisted of a homogenised substance from coagulated and interconnected tissue proteins. The substrate of the electric weld was dehydrated. In the peripheral direction, two layers were separated from the surface of the electrodes: the zone of homogenisation of the adventitia and the zone of coagulation of smooth muscle fibres. The welding seam of this site consisted of the vast majority of collagen hydrocarbons that are present in the adventitia of the artery. The subject of the welding seam had a dense, strong consistency. The structural components of the artery media were characterised by coagulation necrosis. The strength of welding in this area was weaker than in the previous layer, in which were stored nuclei and contours of myocytes. Between the coagulation-modified myocytic fibres there were small cracks caused by the formation of steam, which also reduced the strength of the compound of this site.

Conclusions: Welding of live tissues can be used in vascular surgery, in the formation of a sealed seam of the vascular wall. The main factors of the strength of the substrate of the electric weld seam are the presence, as well as the number, of collagen fibres in the connective tissue.

e-poster number 27

ECAT: HYBRID TREATMENT OF LOWER-LIMB VARICOSE VEINS

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Objectives: Chronic venous disease is the most common disorder of the peripheral vascular system. Endovenous or open surgery for varicose veins is commonly performed for indications that range from cosmetic concerns in young or middle-aged women to treatment of extensive ulcerations in frail, elderly patients. The aim of the study was to evaluate the effectiveness of endovenous chemical ablation and Trendlenberg's operation (eCAT) in treatment of lower-limb varicose veins.

Material and methods: This study was conducted on 150 patients who presented with primary lower-limb varicose veins. The study was performed from December 2014 to January 2017 at Al Azhar University Hospital, Damietta. A total of 195 limbs were treated (105 unilateral and 45 bilateral) in 84 males and 66 females. Forty-three patients presented with venous leg ulcers. The exclusion criteria were: patients who refused the operative procedure after informed consent, bilateral lower limb (LL) pitting oedema, infected or inflamed limb, infected ulcer, LL ischaemia, acute venous thrombosis of LL, chronic deep venous thrombosis of LL, incompetent deep venous system (if maximum reflux velocity > 10 cm/sec), recent history of pulmonary embolism, pregnancy, or allergy to polidocanol. All patients were subjected to: clinical evaluation, routine laboratory investigations, and duplex assessment of venous system of both LLs, which showed an average diameter of great saphenous vein (GSV) of 4-12 mm (with mapping of the saphenofemoral junction, saphenopopliteal junction, and GSV immediately pre-operation). After informed consent and other routine preoperative preparations, in a supine position, with complete aseptic conditions under local infiltration anaesthesia, eCAT was performed.

Results: For 150 patients over a period of one year of clinical and duplex follow-up, rapid recovery was observed. Only in the first two weeks, mild LL oedema and redness were present in 58 patients during the course of GSV, mild pain especially with full extension of the knee and focal thrombophlebitis (about 2 cm) in 17 patients around the knee. After one month, disappearance of these symptoms was observed and duplex follow-up showed marked reduction in the diameter of GSV (2 to 3 mm) without patent segments, recanalisation, or active thrombosis. No neurological complications or skin complications were observed. Ulcers decreased in size without infection and completely healed (within three weeks). Thirty-seven patients required foam sclerotherapy of the extra-axial varicosities – the patients were managed in an outpatient vascular clinic.

Conclusions: Saphenous vein ablation may replace great saphenous vein stripping and phlebectomy, which, when performed as a single procedure without Trendelenburg operation, may increase the risk of recurrence, especially in young age patients. eCAT is a single operation with no recurrence until now, and it can improve on all the drawbacks of conventional surgery, additionally having the advantage of different methods of endovenous ablation.

e-poster number 28

TEMPORARY OCCLUSION WITH AN ULTRASOUND PROBE TO PREDICT THE HAEMODYNAMIC SUCCESS OF SAPHENOUS ABLATION

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Objectives: Air-plethysmography (APG) and photo-plethysmography (PPG) are tests quantifying venous insufficiency. The venous filling index (VFI) of APG and the venous filling time (VFT) of PPG sitting are responsive to reflux ablation. The PPG test can be modified using elevation emptying and dependent filling, so both tests can be performed simultaneously, compared, and standardised on a manually operated tilt-table. The objective was to investigate whether the haemodynamic effects of saphenous occlusion can be predicted prior to endo-venous laser ablation (EVLA).

Material and methods: A manually operated tilt-table was used to standardise gravitational filling and emptying. Its range was from standing at -70° to 40° Trendelenburg. Tilting was performed in < 3 seconds. The legs (n = 17) of 12 patients, median (inter-quartile range) age 61 years (range 42-72), BMI 26.4 (range 23.8-32.1), were tested with concurrent APG and PPG: 1) pre-op, 2) predicted with ultrasound saphenous thigh occlusion, and 3) actual after a short EVLA of the groin segment of the great saphenous vein. Clinical CEAP was: C_2 = 2; C_3 = 4; C_{4a} = 10; C_6 = 1. The follow-up was 73 (range 30-89) days.

Results: In two legs the saphenous vein recanalised, and the leg ulcer healed in another. The venous clinical severity score was not statistically different before (5 [4-6]) versus after EVLA (5 [4-9]), p = 0.153, Wilcoxon. The VFI (mL/s) and the VFT (sec) sitting improved: VFI (pre 3 [2.4-4.4] vs. post 1.4 [1.1-1.9], p = 0.001) and VFT (pre 8 [3-21] vs. post 24 [15-30], p = 0.02). Compared to the pre-op values, the VFT with simultaneous APG and PPG on the tilt-table improved with the saphenous occlusion test (predicted) as well as the post-op value (actual), as shown in Figure 1. Correlations between predicted and actual post improvements in both APG and PPG on the tilt-table were excellent (Fig. 2). Comparing both tests, APG identified the two ultrasound failures in the presence of a universal improvement in the VFI in nearly every patient. With PPG, six legs deteriorated despite a successful saphenous ablation.

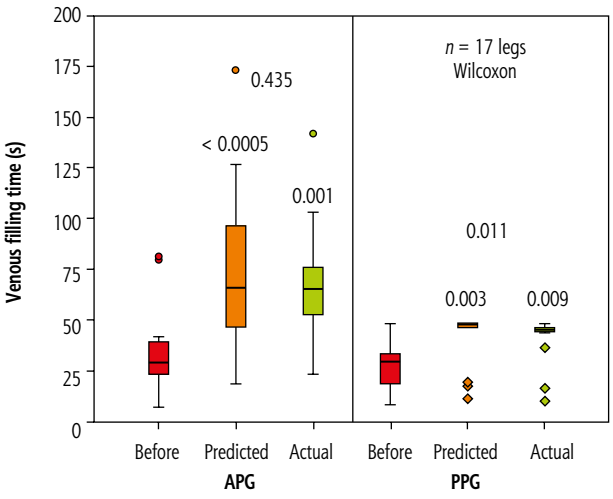

Fig. 1. Predicted and actual post-op values using APG and PPG on a tilt-table

Conclusions: The haemodynamic effects of a proximal saphenous EVLA without phlebectomies can be predicted with accuracy using probe occlusion and APG on a tilt-table. Predicting the amount of haemodynamic improvement before the ablation may be useful in clinical cases when the decision to ablate is controversial.

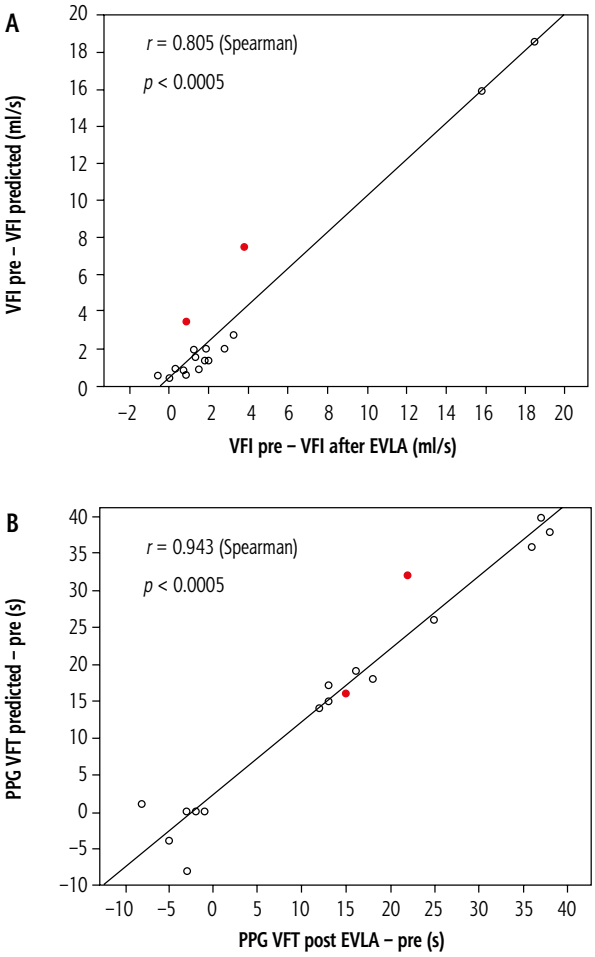

Fig. 2. Correlations between predicted versus post-op responsiveness of (**A**) APG and (**B**) PPG on a tilt-table. Values above zero indicate improvement. The 2 filled circles represent recanalised veins

e-poster number 29

THE EFFECT OF BODY MASS ON OUTCOMES AFTER HIGH LIGATION WITH STRIPPING FOR LOWER VARICOSE VEINS IN DAY SURGERY

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Objectives: High ligation with stripping (HLS) of the great saphenous vein remains the predominant method to treat lower limb varicose veins in the whole world, especially in developing countries; however, the effect of body mass on outcomes after HLS in day surgery remains unclear. This study aims to investigate the short-term and mid-term outcomes based on body mass index (BMI) after HLS in day surgery in a Chinese population.

Material and methods: We performed a prospective cohort study in adult patients with lower varicose veins from a day surgery centre of West China Hospital. We excluded patients undergoing foam sclerotherapy and endovascular radiofrequency ablation, and only patients undergoing HLS were analysed in the study. We assessed the outcomes of Venous Clinical Severity Score (VCSS), Aberdeen Varicose Vein Score (AVVQ), EuroQol five-dimensional questionnaire value (EQ-5D-

5L), and Quality of Recovery Score (QoR-15) between patients with BMI ≥ 24.0 kg/m^2 and BMI < 24.0 kg/m^2 (Chinese standard to judge overweight) at six weeks and six months after surgery.

Results: Between November 2016 and July 2017, 170 consecutive patients with 236 limbs and C2-C4 lesions were eligible for this study. The mean age was 54 ±10 years. Ninety-six (56.5%) patients had a BMI < 24.0 kg/m^2 (group A), and 74 (43.5%) patients had a BMI ≥ 24.0 kg/m^2 (group B). Group B had a higher proportion of male patients (63.5% vs. 38.5%, $p = 0.001$) and smokers (20% vs. 13.5%, $p = 0.028$). Other comorbidities and risks were similar in the two groups. There was no significant difference in VCSS, AVVQ, EQ-5D-5L, and QoR-15 score before surgery; however, group A had a lower AVVQ score than group B (8.10 vs. 10.16, $p = 0.005$) at six weeks and had better outcomes of AVVQ (5.60 vs. 6.46, $p = 0.010$) and VCSS (2.81 vs. 3.38, $p = 0.002$) at six months after surgery. The rest of the outcomes were comparable between the two groups. In addition, all patients showed significant improvements in all outcomes both at six weeks and six months after surgery.

Conclusions: All patients were associated with an improvement in clinical outcomes (CEAP and VCSS class) and quality of life (EQ-5D-5L and QoR-15) after surgery. Normal-weight patients had better clinical outcomes of CEAP class and VCSS class than overweight patients, but there was no significant difference in outcomes of EQ-5D-5L and QoR-15 score. Given these findings, overweight patients should control their body mass before selective HLS for lower varicose veins in day surgery.

e-poster number 30

THE CORRELATION OF LASER POWER AND QUANTITY OF DELIVERED ENERGY WITH THE RECANALISATION INCIDENCE OF INSUFFICIENT SMALL SAPHENOUS VEINS SSVS TREATED WITH ENDOVENOUS LASER ABLATION

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Objectives: In recent years endovenous laser ablation (EVLA) has been recommended as the leading method for the treatment of superficial venous insufficiency. The power of the laser and the amount of energy used in EVLA is still not clearly defined, so professionals rely on their own experience and judgment. The "ideal" amount of energy that does not have complications is required and will be sufficient for a complete, long-lasting occlusion of the lumen of a small saphenous vein (SSV). This study was conducted at the private health facility of the Chicago Vein Institute in Sarajevo. The study includes insufficient SSVs treated with endovenous laser ablation (EVLA) during a period of one year. The main parameters monitored and recorded during the EVLA are as follows: laser power (W), amount of energy delivered (J), duration of treatment (min: sec), and length of treated vein (cm) SSV. The aim of the study was to determine the optimum power and quantity of energy in EVLA in the treatment of SSV needed for total and long-lasting occlusion of SSVs.

Material and methods: Two groups of patients with insufficient SSV were examined, one with a power lower than 6 W and one with a power higher than 6 W, within the standard procedures for the performance of EVLT.

Results: In the group with power of more than 6 W, the recanalisation was statistically significantly lower.

Conclusions: There was a positive correlation between the amount of energy delivered (J) and the duration of treatment of perforated veins. The laser power of 6 W (fibre extraction rate 1 mm/s) for EVLA insufficient SSV resulted in the fewest recalculations.

e-poster number 31

POST-THROMBOTIC SAPHENOUS VEIN TREATMENT WITH THERMAL OCCLUSION POWERED BY SEGMENTARY RADIOFREQUENCY

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Superficial vein thrombosis, observed in 57% of varicose vein patients, is related with a 4-6-fold risk of having DVT or PE; 6-44% of SVT patients will develop DVT, 20-33% have asymptomatic PE, and 2-13% symptomatic PE. GSV is most commonly affected (the risk of VTE is six-fold higher in the presence of the risk factors: mild risk – 9 fold, high risk – 31 fold, high risk and women – 35 fold). Hence, we may have a time bomb in these patients, and we need to treat post-thrombotic GSV when the recanalised segments are long. Although there are no available data for a recommendation about the required length, there are the following therapeutic alternatives available: thermal occlusions, eco-guided foam sclerotherapy, surgery, and medical treatments. The level of difficulty of these procedures is high. Getting the best results requires a high rate of occlusion techniques. Intravenous procedures in these vessels may have some technical difficulties because of intravascular bridles, the thickness of the vein wall, perisaphenous bridles, inextensible compartments for tumescence, and the catheterisation itself. The RFS catheter's low friction material enables Saphenous ablation in post-thrombotic veins. Treating post-thrombotic GSV is no doubt more difficult than non-post-thrombotic veins. In our experience, it has been possible in all cases.

e-poster number 32

SINGLE PHYSICIAN EXPERIENCE OF 15,000 CASES OF ENDOVENOUS ABLATION OVER THE LAST 15 YEARS

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Between January 2003 and January 2018, more than 15,000 cases of endovenous ablation of varicose veins were performed by a single physician, at two centres in Mumbai, India. Of these, detailed records of 11,747 patients were available for retrospective analysis. 67% of patients were between 50 and 70 years of age. Males = 56.1%, females = 43.9%. The odds of having thyroid dysfunction was three times higher in the varicose vein group. Past history of some treatment was observed in 33% of cases. More than 70% of patients were symptomatic of pain or heaviness in the legs. There was bilateral disease in 9.3% of patients. 73.4% had severe C4a disease. 18.9% of patients had an active ulcer, emphasising the late presentation for treatment. Sapheno-femoral junction reflux was observed in 67% of patients, whilst sapheno-popliteal reflux was seen in 13.5%. 6.9% had reflux in both valves in the same extremity. The treatment modality for great saphenous vein reflux was mainly laser, whilst for the small saphenous vein it was foam sclerotherapy. Also, 730 patients of the group comprising GSV reflux underwent a comparison between 1470 bare fibre laser and radiofrequency ablation, which demonstrated no significant difference in long-term results between the two groups. The retrospective analysis of a large number of patients demonstrates that most patients present in the late stage of the disease. Both of the thermal methods of treatment commonly available are equally effective. More work must be done to create awareness of seeking early treatment for significant superficial vein disease amongst the population.

e-poster number 33

EVLA WITHOUT MICROPHLEBECTOMY – DOES IT MAKE SENSE? TWO-YEAR FOLLOW-UP

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Objectives: EVLA without microphlebectomy is a minimally invasive method. It takes less operation time and lower volume of local

anaesthetic, does not leave haematomas, there is no need to use compression stockings, and it causes minimal tissue trauma. The aim of this study was evaluation of the efficiency of isolated EVLA as a treatment method for varicose disease to improve selection of cases with expected maximal regress of varicose veins.

Material and methods: In this study we included patients supposed to undergo isolated EVLA from 1 January to 31 December 2015, which totalled 35 patients (M/F 6/29) and 43 legs. Mean age was 61.8 ±11.2 years. CEAP: C2 *n* = 19 (44%), C3 *n* = 14 (33%), C4 *n* = 7 (16%), C5 *n* = 1 (2%), C6 *n* = 2 (5%). Inclusion criteria: primary varicose with visible varicose veins with diameter more than 3 mm, without expected instant aesthetic result, and without additional treatment for two years after the procedure. Venous reflux: mean diameter of GSV, SSV, AASV 8.95 ±2.64 mm (4-18 mm) – measured 3 cm below the junction. Incompetency of GSV – 31 cases (71%), AASV – 5 (12%), GSV + SSV – 2 (5%), SSV – 3 (7%), AASV + SSV – 1 (2%), GSV + AASV – 1 (2%). Incompetent/re-entry PVs more than 3.5 mm in diameter in 25 cases (58.1%). 34 IPVs: Cockett III (*n* = 17), paratibial (*n* = 10), gastrocnemius (*n* = 7). Mean diameter of IPVs 3.88 ±0.9 mm (3.5-8 mm). Varicose tributaries: small (3-5 mm) – 10 cases (23.3%), medium (5-7 mm) – 20 cases (46.5%), large (> 7 mm) – 13 cases (30.2%). All refluxing trunks were treated in one session with an EVLA 1470-nm diode laser. Clinical indication for the use of compression stockings were in 56% (*n* = 24). LMWH were prescribed for five days. Follow-ups at one day, one month, three months, six months, 12 months, and two years (23-34 m, mean 28.6 ±3.8 m). We collected photodocumentation, interviews, DUS, and evaluation of cosmetic results.

Results: There were no cases with following DVT. In 100% of cases after EVLA we archived full trunk resorption. In the treated IPVs – 34 were occluded (97.1%), 1 PV – recanalisation (2.9%). Mild phlebitis was observed in five cases (11.8%). In two patients with acute ulcers we archived healing (100%). Neoreflux (SSV) – in one case (2.3%). Full resolution of varicose tributaries was registered in 9.3% of cases. Residual veins – in 39 (90.7%). Small residual veins (5 mm – 1 [5%]). Small residual veins (< 3 mm) – 19 (44.2%), 3-5 mm – 19 cases (44.2%), more than 5 mm – 1 (2.3%). Additional sclerotherapy was performed in 11 cases (25,6%). Regress of varicose veins were analyzed in groups with small, medium and large veins. In the group with small veins the following results were obseved: full regression – 3 (30%), veins < 3 mm – 3 (30%), veins 3-5 mm – 4 (40%). Group with medium veins: full regression – 1 (5%), < 3 mm – 9 (45%), 3-5 mm – 9 (45%), > 5 mm – 1 (5%). Group with large veins: < 3 mm – 7 (53.8%), 3-5 mm – 6 (46.2%).

Conclusions: EVLA without miniphlebectomy is effective method. Maximum efficacy in cases with large and medium varicose vein is observed. Large varicose vein regressed to small and very small varicose veins in all cases. Medium varicose veins regressed full and to small and very small veins in 95% of cases. The changes in the cases with small varicose veins is not especcially significant.

e-poster number 34

MEDICAL TREATMENT OF CHRONIC VENOUS DISEASE, POST ENDOVENOUS LASER TREATMENT (EVLT)

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Objectives: Chronic venous disease (CVD) has a considerable socio-economic impact, due to its high prevalence, cost of investigations and treatment and loss of working days. It is also an important cause of discomfort, inability to work, and lack of well-being in millions of people worldwide. Management requires careful differential diagnosis and a systematic long-term multidisciplinary care effort directed toward realistic goals within the context of the patient's lifestyle. Patients suffering from any class of the clinical, aetiological, anatomical, and pathophysiological (CEAP) classification of CVD may be symptomatic (C0s-C6s). Leg heaviness, discomfort, itching, cramps, pain, paraesthesia, and oedema (C3) are the most frequent manifestations of CVD and a major reason for medical consultation. The standard treatments for venous disease of the lower limb include compression bandaging and stockings as well as surgical removal of varicose veins. Drugs for the venous system were initially called phlebotonics because they were believed to act on venous tone. They are still largely used in the symptomatic treatment of CVD and to make patients more comfortable. Phlebotropic drugs, in their modern form, are aimed at a wide range of processes. They are naturally occurring, semi-natural or synthetic substances, some of them combining two or more active principles to improve the efficacy. Most of these belong to the flavonoid family (such as diosmine, esperidine, troxoerutine, oxoerutine, etc.). Flavonoid drugs have been widely used in the management of symptoms of venous disease for many years and have recently been studied in some detail to assess their effects on microcirculation. The aim was to evaluate whether the addition of micronised purified flavonoid fraction (MPFF) to patients undergoing endovenous laser treatment (EVLT) for varicose veins of the lower extremities improves postoperative symptoms and signs of CVD and patient quality of life (QOL).

Material and methods: A total of 110 patients with CVD CEAP class C2-C6 and with at least three CVD-related symptoms were randomly assigned to either the MPFF group (*n* = 56) or the control group (*n* = 54). Patients in the MPFF group received MPFF tablets, 1000 mg daily for two weeks before and four weeks after EVLT. Patients in the control group received standard compression therapy. Venous Clinical Severity Scoring (VCSS) was used to assess postprocedural outcomes, and a questionnaire was used to measure patient expectations and post-treatment satisfaction.

Results: VCSS was significantly decreased at two weeks after EVT in the MPFF group ($p < 0.00001$), but not in the control group ($p = 0.15$). The reduction in VCSS in the MPFF group was also markedly greater than in the control group four weeks after EVT, although this did not reach statistical significance. Patients' QOL was significantly improved in both groups ($p < 0.00001$) at four weeks, with a stronger trend observed in the MPFF group. Physicians' overall satisfaction regarding the use of MPFF was significantly greater at four weeks than at two weeks after EVT ($p = 0.000018$). Patients receiving MPFF expressed significantly greater satisfaction compared with the control group (95% vs. 82%, $p < 0.0001$).

Conclusions: Compression therapy and surgical procedures mainly target the macro circulatory alterations, while phlebotonic drugs can act both on the microcirculatory and macro circulatory alterations at the same time. The application of such measures may reverse or stop the inflammatory process due to lympho-venous oedema. MPFF is of benefit for routine use in combination with varicose vein EVLT due to its vein-specific pharmacological protection.

e-poster number 35

INITIAL SCLEROGLUE PLUS EXPERIENCE – COMBINING RADIAL LASER, SCLEROTHERAPY AND VEIN GLUING IN A SINGLE CATHETER DEVICE

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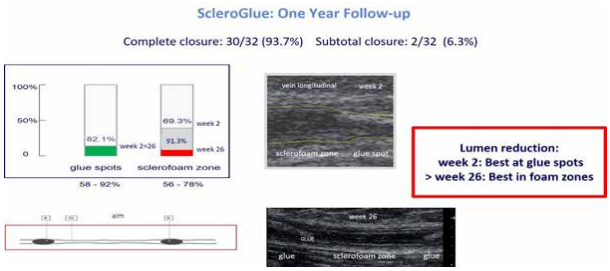
Objectives: Gluing of veins is discussed as being superior to thermo-occlusive methods or sclerotherapy because it can achieve immediate and permanent vein closure. Furthermore, no tumescent anaesthesia is required. However, current gluing devices (VenaSeal, VariClose, VenaBlock) require continuous placement of aggressive n-butyl-cyanoacrylate (NBCA) to induce vein spasm, which is mandatory for an effective displacement of blood. Inflammatory discomfort due to NBCA or to residual blood resorption is frequently observed. The NBCA glue is hardly resorbable; it is a long-term plastic implant. For safety reasons the junction is generously spared, thus SFJ branch relapse (mainly AAGSV) is increased. Segmental glue application is preferred by some investigators, leaving native endothelium and thus another source of relapse. All these drawbacks could be overcome by a new modality that combines endovenous laser for the junction, followed by segmental or pointwise gluing and catheter sclerotherapy.

Material and methods: 32 patients (21 f, 11 m, 41-72 yr.) with GSV insufficiency and diameters of 8-22 mm Ø (mean: 8.9 mm), length 39-62 cm (mean 52.3 cm) underwent endovenous laser (1470 nm, radial, slim fiber) for an 8-cm long junction segment ("laser crossectomy"), followed by a Scleroglue® prototype procedure, comprising sclerother-

apy (Aethoxysklerol 1%, 1+4 with air) and NBCA 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 (32/32) showed immediate saphenous occlusion and reflux elimination. Day one examinations showed the saphenofemoral junction closed without any stump (28/28). Procedural time from first puncture to access closure was 9:30-15:30 min (mean: 11:35 min). No patient reported intra- or postprocedural discomfort. At one-year follow-up, 30/32 cases (93.7%) showed total occlusion, including the junction, 2 cases (6.3%) had subtotal closure apart from the junction. Sclerofoam segments showed up to 45% more diameter regression than glue spots (Fig. 1).

Conclusions: By combining laser crossectomy and ScleroGlue®, optimal morphological and functional results were obtained in this small initial experience. Patient comfort was good compared to the experience with single laser, sclerofoam, or glue procedures. Now the challenge is for the manufacturers to provide a cost-effective (e.g. < 500 USD) device.

e-poster number 36

HOW DO I PERFORM LASER ABLATION: TURBO EVLA?

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This is a video presentation that shows a different way of applying tumescent anaesthesia for the laser procedure. The video presents practical suggestions about how to speed up an endovenous laser procedure for insufficient straight vein segments, which fits for laser treatment. The aim of the demonstration is to show how to save time spent on the procedure if you have a laser fibre pull-beck device.

e-poster number 37

OUTCOMES OF CYANOACRYLATE CLOSURE OF INCOMPETENT SAPHENOUS VEINS WITHOUT A CONCOMITANT PHLEBECTOMY OR ULTRASOUND-GUIDED FOAM SCLEROTHERAPY OF TRIBUTARY VARICOSITY

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Objectives: The objective of this study was to evaluate the effectiveness and safety of endovenous cyanoacrylate closure (CAC) of incompetent saphenous vein and to assess the regression of tributary varicosity after CAC without a concomitant phlebectomy or ultrasound-guided foam sclerotherapy (UGFS) of tributary varicosity.

Material and methods: The cohort data of all incompetent saphenous veins including great saphenous veins (GSV), anterior accessory saphenous veins (AASV), and small saphenous veins (SSV) treated with CAC without a concomitant phlebectomy or UGFS of tributary varicosity in the Vascular Surgery unit of Siriraj Hospital, Bangkok, Thailand from January 2017 and December 2018 were retrospectively evaluated. Duplex ultrasound, Venous Clinical Severity Score (VCSS), the regression of tributary varicosity, and adverse events were examined at intervals of one week, one month, and three months after CAC.

Results: A total of 60 saphenous veins including 50 (83.3%) GSV, 5 (8.3%) AASV, and 5 (8.3%) SSV in 60 limbs of 47 patients treated with CAC without a concomitant phlebectomy or UGFS were included. Fifty-nine (98.3%) truncal veins showed complete closure during the follow-up period. One treatment failure was found. Venous Clinical Severity Scores at the time of all follow-up visits were significantly lower ($p < 0.05$) than those before CAC. Complete resolution of tributary varicosity was noted in 52 (86.7%) limbs after three-month follow-up. Persistent tributary varicosity was found in eight (13.3%) limbs. Adjunct UGFS of tributary varicosity was performed in three (5.0%) limbs due to the persistent venous symptoms. Thrombophlebitis occurred in 11 limbs (18.3%), and hyperpigmentation occurred in six limbs (10.0%). No thrombus extension into the common femoral vein or popliteal vein or deep vein thrombosis was found.

Conclusions: CAC without a concomitant phlebectomy or UGFS of tributary varicosity is safe and effective for the treatment of an incompetent saphenous vein. It also shows a satisfactory result with the regression of tributary varicosity.

e-poster number 38

ENDOVENOUS LASER TREATMENT AND RADIOFREQUENCY ABLATION IN THE TREATMENT OF PATIENTS WITH VARICOSE DISEASE IN THE C 4-C 6 STAGE OF VENOUS INSUFFICIENCY

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Objectives: In the last 20 years endovenous thermal ablation has developed as a gold standard in the treatment of incompetent saphenous varicose veins. Evidence-based indications are: GSV or SSV and accessory saphenous vein incompetence (interfascial part) ablation [1]. As yet there is no single, common approach to the treatment of patients with severe forms of the varicose disease. Among actively operating surgeons there is an opinion that huge and complicated varicose veins should be treated only by operating [2]. The aim of our work is to study the possibility of using thermal methods of ablation during the treatment of patients with varicose disease in the C4-C6 stage of venous insufficiency.

Material and methods: We analysed the treatment results of 158 patients (70% female, average age 56 ±13.5 years) with varicose disease in the C4-C6 stage of venous insufficiency. They were operated from 2012 to 2018. Sixty-seven (42.4%) patients had venous insufficiency: C4, 50 (31.6%) – C5, 41 (26%) – C6 (CEAP). Fifty-nine (37.3%) underwent RFA. The diameter of the GSV in the area of the SFJ was 7-18 mm. Ninety-nine (62.7%) patients underwent EVLT. The diameter of the GSV in the area of the SFJ in this group was 7-18 mm. RFA was conducted with the VNUS closure FAST method electrode catheter with a 7-cm heating segment. For EVLT we used a 1470 nm diode laser with a two-ring radial fibre. EVLT was conducted with power of 9 W with automatic fibre traction (0.7 mm/s; LEED – 130 J/cm). As additional treatment, 43 (27.2%) underwent miniphlebectomy of varicose tributaries GSV with Varady technique. Patients with the C6 stage of venous insufficiency in terms of one to three weeks underwent ultrasound guide sclerotherapy in the zone of trophic disorders with 3% polidocanol foam 4-6 ml. In all the cases the surgery was provided in "office surgery" conditions. All the patients were given anticoagulation therapy low-molecular-weight heparins in prophylactic doses for 7-15 days.

Results: Doppler UD was performed in all the patients the day after the operation; then at one week, at one, three, and six months, and once a year after that. DVT and PE were not found. Complete obliteration of GSV was noted in 100% of the patients.

Conclusions: RFA and EVLT is a safe, minimally invasive alternative to traditional surgical treatment. The use of this technique makes it possible to treat patients with open trophic ulcers in outpatient settings and improve the cosmetic effect of surgical treatment.

References: 1. Pannier F. Keynote: Is thermal ablation the golden standard? 4th scientific meeting of Baltic Society of Phlebology; Varady's 32nd international workshop "From minisurgery to laser ablation". Jurmala – Latvia, May 19-20 2017; 23. 2. Xhera S. Surgery is still needed for huge and complicated varicose veins. Hung J Vasc Dis 2017; 3: 27.

e-poster number 39

ENDOVENOUS LASER ABLATION OF THE POPLITEAL FOSSA VEIN (THIERRY PERFORATING VEIN)

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Objectives: The popliteal fossa vein (PFV) has been described as a tributary of the popliteal vein found in the popliteal fossa, which is anatomically distinct from the great and small saphenous veins and classified as a perforating vein. The aim of the study was to evaluate the results of endovenous laser ablation of PFV.

Material and methods: We studied 32 patients treated in 2017-2018. The patients were CEAP class C2-C4. Endovenous laser ablation (EVLA) was performed on an ambulatory basis with tumescent anaesthesia, 1470/1560 nm diode lasers, and radial fibres. The diameter of the PFV varied from 4 to 12 mm. We used a standard treatment protocol: continuous mode with power range 5.8-6.6 W, LEED 78-180 J/cm. In all patients EVLA was combined with miniphlebectomy or sclerotherapy. In the postoperative period we evaluated the occlusion rate, duration of analgesics, endothermal heat-induced thrombosis (EHIT), and local complications. Ultrasound imaging was performed one, seven, and 14 days and six months after EVLA. We recommended compression stockings for 2-3 weeks and low-molecular-weight heparin in prophylactic doses for five days.

Results: We successfully performed EVLA of PFV in all patients. Occlusion of the PFV was achieved in 100% of cases. No recanalisations were observed in the follow-up. Only 6% of the patients took analgesics on the first day after EVLA. No haematomas, EHIT, deep vein thrombosis, or pulmonary embolism occurred. Only in one patient was transient paraesthesia observed.

Conclusions: EVLA 1470/1560 nm with radial fibres is an effective, safe, and painless procedure in the treatment of incompetent popliteal fossa vein and may be a good alternative to traditional surgery.

e-poster number 40

INFLUENCE OF MPFF ON ENDOTHELIAL FUNCTION IN PATIENTS WITH VARICOSE VEINS

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Objectives: Aim of this study was to evaluate the effects of micronised purified flavonoid fraction (MPFF) (Detralex) on endothelial function in patients with varicose disease.

Material and methods: A two-month controlled study included 100 patients with varicose disease, clinical class C1-C2 according to the CEAP classification. The subjects were allocated into two groups (50 patients each) with or without treatment with MPFF 1000 mg QD for two months in addition to compression therapy. The groups were comparable at baseline regarding the main parameters. All patients underwent clinical examination and duplex ultrasound scanning (DUS) of the lower extremities. Complete blood count, biochemical blood tests for nitric oxide (NO) metabolites and malondialdehyde (MDA), were performed at baseline and after one and two months of MPFF treatment.

Results: At two months the levels of NO metabolites were higher in patients who received MPFF in addition to compression therapy (51.646 ±11.757 vs. 36.310 ±6.921 μmol/L at baseline, p = 0.001). MDA levels decreased significantly in the MPFF group at two months (from 1.220 ±0.190 to 0.858 ±0.231 μmol/L, p = 0.001) but did not change significantly in the group with only compression therapy (from 1.191 ±0.204 to 1.138 ±0.175 μmol/L, p = 0.003).

Conclusions: Treatment with MPFF was associated with a statistically significant increase in the production of NO metabolites and a decrease in the production of lipid peroxidation products, i.e. improved endothelial function in patients with varicose disease.

e-poster number 41

TWO-WAY ABLATION: BIDIRECTIONAL ENDOVENOUS THERMAL ABLATION OF INCOMPETENT SAPHENOUS VEINS USING A 1470-NM LASER AND RADIAL FIBRES

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Objectives: The surgical technique and clinical results of two-way ablation (TWA), bidirectional endovenous laser ablation of incompetent great saphenous veins (GSV), are reported and compared with those treated by a standard ablation technique.

Material and methods: A total of 1676 patients (1676 legs) underwent endovenous laser ablation of the incompetent GSV for four years in a private day surgery clinic in Japan. The device for ablation was a Bioletic 1470-nm diode laser and radial two-ring fibres. The TWA technique is as follows: a small skin incision is made under local anaesthesia, the GSV is taped and cut down, then the laser fibre is inserted into the vein. Tumescent local anaesthesia is injected around the GSV, the proximal GSV is treated by 9-W ablation, and then the distal GSV is also treated by 8-W ablation. In the control group, the GSV is punctured, a sheath introducer is located inside the vein, and then the proximal GSV is treated by 9-W ablation.

Results: A total of 844 patients were treated by the TWA technique (Table 1). Ablation length of the proximal GSV averaged 27.5 cm, and the length of distal GSV averaged 9.7 cm. The LEED of the proximal GSV averaged 60.2 J/cm, and the distal GSV averaged in 40.1 J/cm. Postoperative complications such as saphenous nerve injury or wound infection were not significantly higher than those treated by a standard technique. Severe complications such as deep vein thrombosis or pulmonary embolism were nor observed in either group. One month after the surgery, the occlusion rate of the treated GSV was 100%.

Conclusions: Although a small skin incision is necessary, the TWA technique is considered as one of the possible options for endovenous laser ablation of incompetent GSV, with a high success rate.

Table 1. Clinical results of two-way ablation (TWA) and a standard technique (as control)

TWA (*n* = 844)	Control (*n* = 832)	
Proximal GSV	27.5 cm	36.2 cm
Distal GSV	9.7 cm	NA
Proximal LEED	60.2 J/cm	59.1 J/cm
Distal LEED	40.1 J/cm	NA
Operation time	26.6 min	23.9 min
Post-op complications	2.8%	3.4%
Nerve injury	0.7%	1.3%
Wound infection	0.1%	0.2%
One-month occlusion	100%	100%

e-poster number 42

QUO VADIS (ENDO)VENOUS SURGERY?

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Objectives: The operation technique of varicose veins has evolved spectacularly solutions in the last 15-20 years due to endovenous. Incisions have become smaller, but the main step of the traditional open surgery has remained the mechanical removal of the saphenous vein by stripping, even with cryovaricectomy. This method caused surrounding tissue damage, avoidance of which was the main goal in developing novel techniques. Endovenous laser (EVLA) and radiofrequency ablations (ERFA) meant a new era in the treatment of varicose veins. Based on thermal ablation of the veins, the race between the improving laser and radiofrequency techniques resulted in not only improved efficacy, but also greater patient safety. Avoiding thermal damage, a glue-based seal-

ing technique has been developed as well and has started to gain ground. Besides evolving therapy, even diagnostic methods have progressed from huge, low-resolution sonography devices to compact, one-handed, wireless tools, easy to use even with mobile IT devices. Thirteen years after the first endovenous operation in Hungary, we have seen the evolution of the technique through the experience of over 1700 EVLT surgeries. Decreasing thermal damage became the target of the race between endovenous methods, since all further complaints are connected with this side effect. The latest innovation on this field is based on microwave technique (MwVAS). This system has a good thermal penetrability and high efficiency, and the lower temperature (80°C) at the tip of the microwave probe rarely causes perforation of the vein wall compared with EVLA and EVRA; therefore, with the same treatment effect and recovery period, fewer postoperative complications are feasible.

Material and methods: From November 2018 to February 2019 ten cases were assigned to microwave ablation as the first MwVAS interventions in Hungary (20 limbs total – 10 limbs for the microwave group, 10 limbs for the control EVLT group). The visibility of the microwave antenna was powered by Landwind Medical MINO wireless colour doppler ultrasound system, which is easy to pocket, easy to connect, and shows high-resolution image on a mobile phone, tablet PC, laptop PC, or even smart TV. We compared the results considering the side effects (operating time, hospital stay, ecchymosis, burning sensation, postoperative swelling, aesthetic difference) based upon a patient-completed survey.

Results: There was no significant difference in operating time and hospital stay between the two groups. Ecchymosis and burning sensation were slightly lower in the microwave ablation group. Further results, such as the recanalisation – occlusion rate, require further follow-up investigations.

Conclusions: The microwave ablation system is a safe and effective alternative to other endothermal ablation methods without serious complications and better cosmetic results. Therefore, as our knowledge increases with the novel diagnostic and endovenous devices, so they are shrinking in size.

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e-poster number 43

THE UTILITY OF WEB-BASED VIDEOS ON VARICOSE VEINS

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Objectives: There has been little investigation of videos related to varicose veins present among web-based media in China. The present study aimed to investigate the characteristics and scientific accuracy of such videos uploaded to the website www.youku.com.

Material and methods: Searches on the youku.com website were performed during the month of November, 2018. The search key words included varicose vein, varicose veins, and varicose veins of lower extremities. The retrieved videos were assigned to one of three groups; useful, partly useful, and not useful, based on criteria including scientific content, contemporariness, and accuracy. Statistical analysis was performed only on the videos rated as useful.

Results: In total, 635 (75.6%) of 840 retrieved videos were excluded. Many of the videos on the website were uploaded by health professionals (31%, $n = 64$). Among all the videos included, those from official institutions were viewed statistically significantly more than videos uploaded by all others. In addition, a larger number of useful videos were uploaded by official institutions than by others.

Conclusions: Official institutions should provide more web-based videos including up-to-date, complete, and accurate information about varicose veins. Furthermore, more effective search tools are needed for identifying videos uploaded by academic sources and institutions.

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e-poster number 44

COMPLICATION IN ILIAC VEIN STENTING IN A PATIENT WITH DIALYSIS ACCESS AV GRAFT

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Iliofemoral vein stenting is used commonly for symptomatic post thrombotic syndrome. It is a minimally invasive approach to venous lesions, which is a well-tolerated, safe, and effective procedure with an acceptable complication profile, even in elderly people. Small extravasation of contrast material can be safely ignored while the procedure is ongoing, but in the caser of large extravasation the procedure should be stopped and retried a few weeks later. Here we report a case of 44-year-old female (a case of chronic renal failure) who was undergoing haemodialysis for six years, who came back two weeks after a left leg AV graft formation because of persisting and increasing limb oedema. Venography showed chronic total occlusion of the iliac vein, which was asymptomatic before the AV graft. Hence, she became a candidate for endovascular intervention but developed perforation after stenting. The important point is that we rather had to place a stent graft in the above case, contrary to what we expect in routine venous stenting. It seems that the management of PTS in the presence of ipsilateral AV graft is different from those without high flow state.

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e-poster number 45

DOES ENDOVENOUS TREATMENT OF ACUTE ILIOFEMORAL DVT PREVENT POST-THROMBOTIC SYNDROME (PTS) OCCURRENCE?

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Objectives: Assessment of haemodynamic dysfunctions and occurrence of PTS symptoms in patients after endovenous treatment of acute iliofemoral DVT by means of pharmaco-mechanical thrombectomy AngioJet, catheter-directed thrombolysis (CDT) and angioplasty.

Material and methods: Nine patients with acute iliofemoral DVT (< 14 days) were treated with endovenous techniques. The thrombus was removed from iliac and common femoral veins to the level of the deep femoral vein. In each patient AngioJet thrombectomy with adjunctive CDT was performed done initially. All procedures were completed with balloon angioplasty with or without stenting. Based on pre- and post-procedural venography, each of four venous segments (VCI, CIV, EIV, CFV) treated with endovascular techniques were assessed according to PEARL Registry thrombus score. During follow-up visits duplex-scanning was performed and the Villalta scale was used to diagnose PTS.

Results: The average age of patients was 53.1 years (range 21-70). There were three women and six men. The median thrombus score before and after the treatment was 8 and 1 points, respectively. The mean value of clot removal was 82.4% (67-100%). The control duplex-scanning of treated segments did not show any venous occlusion. There were two segments with significant recanalisation and one segment with reflux. In contrast, in the femoropopliteal segments that were treated conservatively, duplex-scanning showed four occlusions; three medium recanalisations and four refluxes. Hemodynamic dysfunctions in treated segments were significantly less frequent than in untreated ones, $p < 0.01$. None of patients was diagnosed with PTS, median Villalta score was 1 point (0-4).

Conclusions: Endovascular treatment of acute iliofemoral DVT may significantly improve venous outflow and diminish the risk of PTS.

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e-poster number 46

LOCAL THROMBOLYSIS FOR VASCULAR ACCESS DEVICE OCCLUSION RECOVERY IN CANCER PATIENTS

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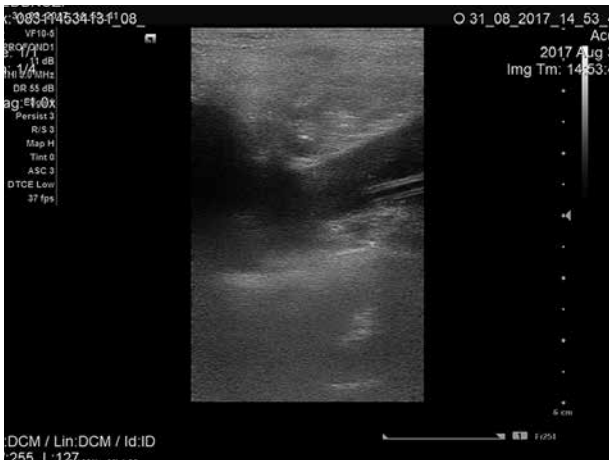
Objectives: To evaluate local thrombolysis efficacy for venous port occlusions in cancer patients.

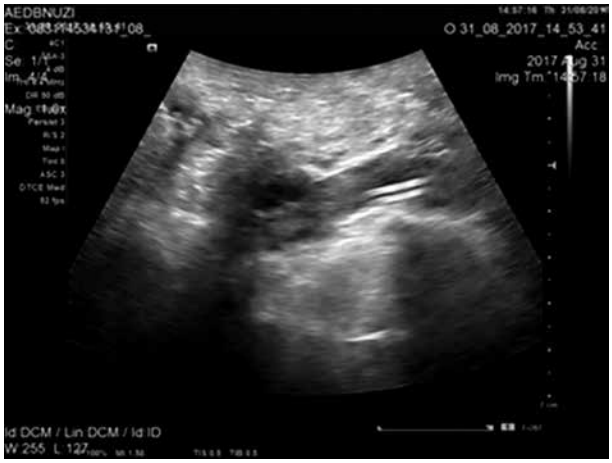
Material and methods: In our analysis 325 patients with implanted central venous port were included. Mean patients' age was 45 years. Access distribution was as follows: subclavian $n = 298$, jugular $n = 22$, and femoral $n = 5$. After intervention every patient was included in an observational program: visits to surgeon (at one, three, six, and 12

months), subclavian and superior caval vein ultrasound examination, and echocardiography. In the case of pulmonary embolism suspicion, chest CT and pulmonary CT angiography were performed. In the case of device occlusion, X-ray by C-arm with contrast enhancement was performed.

Results: In 39 patients (13.5%) venous thrombosis or device occlusions were revealed. All these patients received low-molecular-weight heparin (LMWH). In 11 cases anticoagulation was ineffective and local thrombolysis with active thrombotic mass aspiration was performed. On the first step by C-arm X-ray investigation, device occlusions was confirmed, and then a thrombolytic agent was injected into the system with mean 20-min exposition, and after good blood aspiration patency was confirmed by venography. Initial success was achieved in nine patients (81.8%). In two patients we performed device explantation due to the absence of recanalisation and risk of thrombosis progression.

Conclusions: Based on our study results, we suggest timely use of local thrombolysis in patients with vascular access device occlusions. Local thrombolysis is well tolerated and characterised by good patency recovery.





e-poster number 47

AN OBSERVATIONAL STUDY OF CHRONIC VENOUS DISEASE IN NORTHWEST CHINA

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Objectives: Chronic venous insufficiency (CVI) affects approximately one fifth of the general adult population in western countries and results in significant psychological, physical, and financial burden. The related epidemiological findings in the northwest region of China are scarce. This study aims at prospectively evaluating consecutive CVI patients using the VVSymQ®/HASTI and Venous Clinical Severity Score (VCSS) according to CEAP classification.

Material and methods: From September 2017 to April 2018, consecutive patients with CVI symptoms and varicose veins referred for duplex ultrasound exam at Xijing Hospital were evaluated. CEAP classification was applied, and the highest C class was used to characterise patients. VVSymQ®/HASTI and VCSS scores were adopted to describe symptom severity and compared between each C class using one-way analysis of variance (ANOVA) via SPSS version 13.0 (SPSS, Chicago, IL, USA). Continuous data were expressed as means ±standard deviation. A p value less than 0.05 was considered statistically significant.

Results: A total of 169 patients were evaluated. Forty-three patients (25.4%) presented with C2, 24 patients (14.2%) C3, 61 patients (36.1%) C4, 26 patients (15.4%) C5, and 15 patients (8.9%) C6 (Table 1). All patients had varicose veins. The mean value of VVSymQ®/HASTI in patients with C2, C3, C4, C5, and C6 were 6.05 ±2.21, 8.41 ±2.93, 10.42 ±3.08, 11.65 ±4.02, and 13.77 ±4.75, respectively. Significant differences were observed between C2/C3, C3/C4, C4/C5, C5/C6, and C2/C6 (F = 6.103, p < 0.001) (Table 1). The mean values of VCSS were 3.97 ±1.83, 6.95 ±2.14, 8.17 ±3.28, 14.00 ±3.21, and 16.64 ±4.75, respectively. Significant differences were observed between C2/C3, C3/C4, C4/C5, C5/C6, and C2/C6 (F = 38.71, p < 0.001) (Table 1).

Conclusions: This is the first observational study on epidemiologic pattern of CVI in northwest China. A positive correlation was observed between VVSymQ®/HASTI, VCSS, and increasing C class. Moreover, there appeared to be a predominance of more advanced stage disease (C4 and above) according to C class.

e-poster number 48

COMPARISON OF TRANSABDOMINAL AND INTRAVASCULAR ULTRASONOGRAPHY IN MORPHOMETRIC ANALYSIS OF COMMON ILIAC VEINS

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Objectives: Non-thrombotic iliac vein lesions (NIVL) are common, and in some patients with primary varicose veins they may be responsible for symptoms such as pain and oedema. These lesions can be diagnosed by contrast-enhanced computed tomography, magnetic resonance angiography, or intravascular ultrasound, which is the most sensitive method. The use of these methods is hindered by costs, availability, and invasiveness. Duplex ultrasonography is a cheap, widely

Table 1.

Scale	C2 *n* = 43 (25.4%)	C3 *n* = 24 (14.2%)	C4 *n* = 61 (36.1%)	C5 *n* = 26 (15.4%)	C6 *n* = 15 (8.9%)	*F* test *p*-value
VVSymQ®/HASTI	6.05 ±2.21	8.41 ±2.93	10.42 ±3.08	11.65 ±4.02	13.77 ±4.75	F = 6.103 p < 0.001
VCSS	3.97 ±1.83	6.95 ±2.14	8.17 ±3.28	14.00 ±3.21	16.64 ±4.75	F = 38.71 p < 0.001

available, and non-invasive method of assessment of the venous system. However, its use in diagnosis of NIVL is not clearly established. The purpose of this study was to compare the transabdominal duplex ultrasound with intravascular ultrasound in morphometric assessment of common iliac veins in patients with primary varicose veins.

Material and methods: Fourteen patients with primary varicose veins, who qualified for great saphenous vein high ligation and stripping, were included. The median age of patients was 46 years, and the median body mass index was 25.8 kg/m^2. Right common iliac vein (RCIV) and left common iliac vein (LCIV) were interrogated prior to varicose vein surgery with transabdominal duplex ultrasound (TDUS) and during the procedure with intravascular ultrasound (IVUS). The reference vein diameter (RVD) and minimal lumen diameter (MLD) were measured with both imaging modalities, and percentages of stenosis of interrogated veins were calculated. The results obtained by TDUS and IVUS were compared with paired Student's *t*-test (in cases of normality of distribution of differences between measures) or paired Wilcoxon test (otherwise).

Results: The RVD measured by IVUS was significantly higher than that measured by TDUS for RCIV, at 12.8 and 9.6 mm, respectively, (p = 0.009) and LCIV 13.8 and 8.7 mm, respectively (p = 0.002). The MLD measured by IVUS did not differ significantly from that measured by TDUS both for RCIV, at 8.9 and 7.9, respectively (p = 0.257) and LCIV, at 5.5 and 5.6 mm, respectively (p = 0.875). The %S calculated from IVUS measurements was significantly higher than that calculated from TDUS measurements for RCIV, at 37 and 8.9%, respectively (p = 0.002) and LCIV, at 59.8 and 24.7%, respectively (p = 0.017).

Conclusions: Transabdominal duplex ultrasound in comparison with intravascular ultrasound tends to underestimate the diameter and stenosis of common iliac veins; however, it seems to be equally accurate in the measurement of the diameter of stenotic segments.

e-poster number 49

THE ASSOCIATION BETWEEN CLINICAL FACTORS AND OCCURRENCE OF NON – THROMBOTIC ILIAC VEIN LESIONS IN PATIENTS WITH CHRONIC VENOUS DISORDERS

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Objectives: Recently, non-thrombotic iliac vein and inferior vena cava lesions (NIVL), due to their possible role in chronic venous insufficiency on the one hand and due to the development of endovascular venous techniques on the other hand, have gained much interest. The purpose of this study was to identify clinical factors associated with the occurrence of NIVL in patients with chronic venous disorders.

Material and methods: Thirty-three patients (eight men and 25 women) of median age of 48 years, with primary varicose veins that were qualified for great saphenous vein high ligation and stripping were included. The data concerning age, sex, body mass, height, body mass index, body surface area, hypertension, hypercholesterolaemia, smoking, number of pregnancies, and previous abdominal surgeries including caesarean section were collected. During the varicose vein surgery both iliac venous axis and inferior vena cava were interrogated with intravascular ultrasound. The percentage of stenosis of interrogated veins was calculated. The association between clinical factors and morphology of iliac veins and inferior vena cava was statistically analysed.

Results: In univariate analysis age negatively correlated with left common iliac vein (LCIV) stenosis and male sex, and greater body surface area and hypertension were associated with lesser stenosis of left external iliac vein. In a multivariate analysis, only age significantly negatively correlated with LCIV stenosis (p = 0.027). There was a correlation of borderline statistical significance between female sex and LCIV stenosis (p = 0.073). No other correlations were observed.

Conclusions: Except for age and possibly sex, there are no associations between NIVL and other anthropometric and clinical factors.

e-poster number 50

POPLITEAL VEIN COMPRESSION... IS IT ONE OF THE MAIN CAUSES OF DVT?

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Objectives: Popliteal vein compression syndrome has been described in the literature, and asymptomatic morphologic popliteal vein entrapment is frequently found in the healthy population (about 27%), and popliteal vein compression on plantar flexion was observed in about 40% of ascending venograms. Only in the last few years has it been looked at seriously as a cause of deep vein thrombosis (DVT) and chronic lower limb venous disease. The aim of the study was to examine the pathophysiological importance of popliteal vein compression in select patients, suggests a diagnostic tool and describes treatment with surgery

Material and methods: Twenty-seven limbs (20 patients) with popliteal vein compression were included. All of them were admitted to the Alexandria Armed Forces Hospital from January 1, 2016 to June 30, 2017. Clinical examination was performed according to CEAP. The body mass index (BMI) was calculated, and venous duplex in flexed and extended positions was performed. Ascending venography in severely compressed veins was performed, and popliteal vein pressure was measured by means of the introduction of a 2F transducer tip catheter. Severely symptomatic patients with venographic and haemodynamic evidence of popliteal entrapment were selected to have popliteal vein release. Haemodynamic and clinical follow up was performed.

Results: The mean age of the treated patients was 34.6 and 35.2 years, respectively, (female/male: 12/8), and the median BMI was 27 (range 22-30). The popliteal vein diameter was 9.4 m (range, 8.0-20.0 mm) upon knee flexion, compared with 0 mm (range 0.0-0.1 mm) upon knee extension. Upon knee flexion, pressure was 10.0 (range, 4-20), and upon knee extension the median PCP in the PVCS group was 53 cm H_2O (range, 38-76 cm H_2O).

Conclusions: PVCS is associated with high popliteal compartment pressures. The pathophysiology of popliteal obstruction, in the absence of anatomical abnormalities is related to an increase in the popliteal compartment pressure while standing due an increase of the popliteal fat pad, related to high BMI. And this may increase the possibility of venous thrombosis.

e-poster number 51

THROMBOSIS OF PERFORATING VEINS: FREQUENCY, STRUCTURAL PECULIARITIES OF TREATMENT, AND CONNECTION WITH CANCER

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Objectives: Acute varicose vein thrombosis is one of the main varicose disease complications. That is why our aim was to investigate the frequency, character, and division of perforating vein thrombosis in the lower limbs, and the peculiarities of its treatment.

Material and methods: A retrospective analysis was based on the treatment of varicose vein thrombosis from 2010 to 2017 at Kherson City Clinical Hospital named after Ye. Ye. Karabelesh. During the stated period 654 in-patients were treated for acute varicose vein thrombosis. Thirty-nine (5.96%) patients did not possess varicose vein thrombosis in the superficial system of the saphenous vein (*vena saphena magna* and *vena saphena parva*). Seventeen (43.6%) men and 22 (56.4%) women with a mean age of 47.5 years were studied. The average presence of varicose veins constituted 12 years, and the average sickness duration was 6.1 days. A duplex ultrasound examination protocol was followed for each patient to determine character, localisation, and dissemination of the thrombotic process into the deep veins as well as to investigate deep or superficial venous reflux. General methods of medical check-up and initial search for cancer were performed. Duplex ultrasound scan of veins in the lower extremities was done with the help of a SIEMENS ACUSON CV-70 with 5-10 MHz linear array. Operative treatment was

conducted under spinal anaesthesia. Anticoagulation therapy was prescribed in the postoperative period to all patients.

Results: Thrombosis of varicose veins (which were connected with deep veins through perforating veins) was found in all patients. Three main groups can be singled out where perforating vein thrombosis mostly took place. There was a connection with the popliteal vein in 10 (25.6%) cases, through Cockett's perforating veins in 19 (48.7%) cases, through Dodd's perforator in nine (23.1%), and one case had a floating component into the common femoral vein through the epigastric vein. According to the level of thrombosis, the division was as follows: flotation into deep veins in 17 (43.6%) cases, perforating vein thrombosis in 14 (35.9%), and thrombosis of varicose branch from the perforating vein system in eight (20.5%) cases. Thirty (76.9%) patients underwent surgery, and nine (23.1%) were treated conservatively. Among operative methods of treatment thrombectomy from deep veins with perforating vein ligation was undertaken in 17 (43.6%) cases, and the perforating vein itself was ligated in 13 (33.3%) cases. Pulmonary embolism of small branches was detected by multislice spiral computed tomography (MSCT) with no clinical evidence in four (10.2%) cases. Malignancy was identified in seven (17.9%) patients for the first time in their lives after the conducted search for cancer.

Conclusions: The frequency of perforating vein thrombosis constituted 5.96%, and the progression of perforating vein thrombosis to deep vein thrombosis was 43.6%. The main method of treatment must be a surgical one in order to prevent the progression of perforating vein thrombosis to deep vein thrombosis and pulmonary embolism, as well as to eliminate the cause of varicose disease. The rate of presence of malignancy based on the findings of the advanced search for cancer among patients with perforating vein thrombosis was 17.9%.

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e-poster number 52

GENERIC RECOMBINANT FACTOR VIIA IS COMPARABLE TO BRANDED NOVOSEVEN IN IN-VITRO AND PHARMACOKINETIC STUDIES IN PRIMATES

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Objectives: Recombinant factor VIIa (NovoSeven®, NovoNordisk, Bagsvaerd, Denmark) is used in the management of bleeding in patients with haemophilia. A generic version of NovoSeven® has also been developed for the same indication (AryoSeven™, AryoGen, Tehran, Iran). The purpose of this study was to compare several batches of generic rFVIIa, namely AryoSeven™, with multiple commercially available batches of branded NovoSeven® to determine their biosimilarity.

Material and methods: Four commercially available random lots of NovoSeven® were obtained through US and European sources and compared to five clinical batches of AryoSeven™. These drugs were profiled in vitro using surface-enhanced laser desorption ionisation (SELDI) mass spectrometry, gel electrophoresis (GE), immunoblotting studies, and procoagulant activity as measured by a clot-based method. Thrombin generation studies were carried out using NHP supplemented with 0-1.0 ug/ml rFVIIa. The pharmacokinetic profiles of one representative batch each of the NovoSeven® and AryoSeven™ were studied in primates after a 50 ug/kg bolus IV.

Results: The molecular weight profile of all rFVIIa preparations were comparable. The GE and immunoblotting studies of the two groups of agents showed a comparable profile. The two FVIIa products produced comparable procoagulant effects in the PT and aPTT assays. In the plasma prepared from rFVIIa-supplemented whole blood, the products produced a comparable effect on the PT and aPTT assays. In platelet-rich plasma (PRP) and platelet-poor plasma (PPP) AryoSeven™ and NovoSeven® at concentrations from 0.125 to 1 μg/ml did not produce any measurable change in either the PT or aPTT assay. The degree of reversal of anticoagulation in samples collected from patients treated with oral anticoagulants was similar in terms of relative correction of the plasma INR with both FVIIa preparations over the concentration range of 0.03 to 1 μg/ml. In the thrombin generation studies NovoSeven® and AryoSeven™ produced similar effects. In the primate pharmacokinetic studies at a dose of 50 ug/kg, both groups exhibited similar pharmacokinetic profiles in terms of biologic half-life, Cmax, volume of distribution, and other parameters.

Conclusions: These studies demonstrated bioavailability between the branded and generic products. The pharmacokinetic profile of the NovoSeven® and AryoSeven™ as studied in primates by measuring the factor VIIa level for up to four hours post-administration were also found to be comparable. These results support the hypothesis that NovoSeven® and AryoSeven™ are biosimilar. Further clinical validation studies are warranted.

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e-poster number 53

ENDOVASCULAR MANAGEMENT FOR SALVAGE OF FAILING ARTERIO-VENOUS FISTULA

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Objectives: The purpose of this retrospective observational study is to evaluate the primary and secondary patency rates after initial endovascular intervention to restore and preserve the patency of failing autogenous arteriovenous fistulae and to identify the potential factors that affect the durability of the procedure.

Material and methods: The results of 56 patients with failing autogenous arteriovenous fistulae were retrospectively analysed after being treated with percutaneous transluminal balloon angioplasty from March 2014 to January 2018. Technical and clinical success rates were reported. The variables, including patients' demographics, co-morbidities, medications, fistula age, fistula type, site, number of lesions, and degree of stenosis were analysed and correlated with primary and secondary patency rates.

Results: The mean age of the fistulae included in the study since their creation was 17.4 ±9.6 months, most of which were radiocephalic fistulas (64.3%). The most common cause of autogenous access dysfunction was 90-99% stenosis while the most common site of stenosis was juxta-anastomotic. Technical and clinical success rates of the study population were 92.9% and 89.3%, respectively. The mean primary and secondary patency were 12.3 and 19.9 months, respectively. Primary patency rates at 6, 12, 18, and 24 months were 79%, 64%, 57%, and 44%, respectively. Secondary patency rates at 6, 12, 18, and 24 months were 85%, 76%, 68%, and 52%, respectively. Patient age ≥ 60 years old was associated with reduced post-PTA primary patency ($p < 0.001$) and secondary patency ($p = 0.018$). Dyslipidaemia showed a marked decrease in both primary and secondary patency rates ($p < 0.001$). Insulin intake ($p < 0.001$) was a predictor of primary patency decrease, while use of antiplatelets was, to a lesser extent, a predictor of secondary patency loss ($p = 0.004$). Radiocephalic fistulae had short primary patency ($p = 0.016$), while stenotic lesions > 90% showed a significant decrease ($p < 0.001$) in primary patency that was more obvious than with secondary patency ($p = 0.006$). Lesions at arteriovenous anastomosis were significantly associated with a decrease in primary patency ($p < 0.001$). Statins were the only medications associated with longer primary patency ($p < 0.001$). Age of fistula and number of lesions were independent factors.

Conclusions: Endovascular treatment is both safe and effective in managing failing autogenous arteriovenous fistulas. Although its technical and success rates are high, primary and secondary patency rates are still questionable. Dyslipidaemia, insulin, statin, and antiplatelet intake together with age of patient, and degree and site of stenosis are potential risk factors that affect these rates.

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e-poster number 54

SHOULD WE ROUTINELY PRACTICE VENA CAVA FILTER DEPLOYMENT PRIOR TO PERCUTANEOUS ENDOVENOUS THERAPY FOR PROXIMAL LOWER LIMB DEEP VENOUS THROMBOSIS?

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Objectives: Anticoagulant therapy remains the prevalent treatment for venous thromboembolism (VTE). In the new era of percutaneous

endovenous intervention, there is a progressive rise in the use of percutaneous endoluminal clot dissolution techniques as catheter directed thrombolysis (CDT) and mechanical aspiration thrombectomy (MAT) devices due to the established short-term benefits. Prophylactic deployment of an inferior vena cava (IVC) filter during percutaneous endovenous therapy for lower extremity deep venous thrombosis (DVT) is still a debatable issue. Our study aims to retrospectively assess the frequency of embolisation and the need for deployment of a retrievable IVC filter during endovenous treatment of proximal lower extremity DVT using percutaneous CDT and MAT techniques.

Material and methods: Percutaneous endoluminal clot dissolution using either CDT or MAT for proximal lower extremity DVT was performed on 64 limbs in 58 patients from 148 patients diagnosed with proximal acute/subacute DVT in the vascular surgery departments of study hospitals. An IVC filter was deployed in 31 patients prior to or during the procedure.

Results: From 58 patients who were treated for proximal DVT with clot debulking procedures, an IVC filter was prophylactically deployed in 30 patients (51.7%). Trapped thrombus in the deployed filters, as revealed on venocavography, was observed in 8/30 (26.7%) filters deployed prophylactically, with an overall rate of thrombus embolisation during percutaneous endovenous thrombus dissolution techniques of 11/58 patients (18.9%).

Conclusions: Catheter-directed thrombolysis could be done safely and effectively without routine prophylactic IVC filter placement in treating acute DVT. Selective filter placement may be considered in patients undergoing mechanical thrombectomy or patients with more proximal thrombus pattern with multiple risk factors.

e-poster number 55

USE OF ULTRASOUND THROMBOELASTOGRAPHY FOR CHOICE OF TREATMENT TACTICS IN PATIENTS WITH POSTOPERATIVE VENOUS THROMBOSIS

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Objectives: Postoperative venous thrombosis causes pulmonary embolism (PE) in 0.3-4.2% of cases (Cynningham *et al.* 2015). In a number of cases, ultrasound investigation of postoperative venous thrombosis turned out to be unreliable in the diagnosis of embolic forms of venous thrombosis (Barinov *et al.* 2014). The aim of the study was to prevent PE in patients with post-operative venous thrombosis.

Material and methods: An investigation of the venous system of the inferior vena cava and determination of the sonoelastographic properties of the venous thrombus was conducted using a Siemens Acuson S2000. After topical diagnosis the sonoelastographic characteristics of the thrombus were immediately determined. At a velocity of propagation between 2.5 and 2.6 m/s of a shear wave there is a high risk of PE, at a velocity between 2.7 and 2.9 m/s there is moderate risk, and at a velocity of 3.0 m/s there is no threat of embolism.

Results: The research presents the results of examination and operative treatment of 729 patients. According to Caprini's scale (2012), it was revealed that 316 (43.35%) patients have a very high risk, and 413 have a high risk of thromboembolic complications. Thromboprophylaxis was conducted in accordance with the provisions of the ACCP (2016). Postoperative thrombosis in the system of the inferior vena cava was revealed in 118 (16.19%) cases. Ultrasound thromboelastography of the floating segment of the ilio-femoral venous thrombus revealed the velocity of shear wave propagation in the range 2.5-2.6 m/s (one observation), and of the floating segment of the thrombus at the level of the common femoral vein – 2.5-2.6 m/s (four observations). The proximal segment of the femoral-popliteal venous thrombus of 1.4-1.7 cm in length was characterised by the velocity of shear wave propagation in the range of 2.7-2.8 m/s (three observations). Thrombosis of cambaloid and mandibular sinuses with continuation in the popliteal vein was characterised by the velocity of shear wave propagation in the range of 2.5-2.6 m/s (two observations). The proximal segment of the tibial-popliteal venous thrombus of 1.2-1.5 cm in length was characterised by the velocity of shear wave propagation in the range of 2.7-2.8 m/s (two observations). It was revealed that there was a high risk of embologenic thrombosis in seven observations, and a moderate risk in five observations, which was an indication for implementation of urgent methods for prevention of PE. 106 patients with post-operative venous thrombosis received anticoagulant therapy.

Conclusions: Postoperative venous thrombosis with sonoelastographic distribution of the shear wave propagation in the ranges of 2.5-2.6 m/s and 2.7-2.8 m/s should be considered embologenic and is an indication for implementation of urgent methods for prevention of pulmonary embolism.

e-poster number 56

HEPARINS DERIVED FROM OVINE (SHEEP) MUCOSA ARE INTERCHANGEABLE WITH THEIR PORCINE (PIG) COUNTERPARTS

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Objectives: Heparin is the most widely used anticoagulant drug for parenteral indications, including surgical, interventional, and medical usage. Currently, available heparin is obtained from porcine (pig) intestine. For Muslim countries, an alternate source of heparin, from non-porcine origin such as ovine (sheep), may be more acceptable for religious reasons. The purpose of this study is to compare ovine heparin with currently available porcine heparin to demonstrate their biosimilarity.

Material and methods: Several batches of powdered porcine heparin were commercially obtained. Powdered ovine heparins were provided by Ronnsi Pharmaceutical Co., China. These heparins were compared for the anticoagulant (ACT, aPTT, TT), antiprotease (Anti-Xa, Anti-IIa), and USP potency cross-referenced against USP reference heparin. Molecular profile studies were carried out as specified by the U.S. Food and Drug Administration FDA. Protamine titration studies were carried out for both preparations using various tests. The relative interactions of these heparins with HIT antibodies were also investigated using HIT antibodies obtained from patients employing platelet aggregation studies. Thrombin generation inhibition studies were also carried out.

Results: The molecular profile of ovine and porcine heparins were comparable and ranged from 15-18 kDA ($p < 0.05$). The anticoagulant activities in all the assays were also comparable for the ovine and porcine heparins. The USP potency of several batches of porcine heparin ranged from 170-200 U/mg (mean = 182 ±12) whereas the ovine heparin exhibited 160-210 U/mg (mean = 184 ±16) potency ($p < 0.05$). In the protamine titration curves, both heparin preparations provided superimposable results. Similarly, in the HIT antibody assays, the behavior of ovine and porcine heparin was identical.

Conclusions: These studies clearly demonstrated that the ovine heparins exhibit comparable molecular profiles and anticoagulant activities. Furthermore, in the USP assay, the potency of these preparations were similar. Thus, ovine heparin should be considered biosimilar to its porcine counterpart and is expected to provide similar results in various clinical indications.

e-poster number 57

ENDOVASCULAR TREATMENT OF ONE CASE OF STAGE III ARTERIOVENOUS MALFORMATIONS (AVM) INVOLVING THE RIGHT SUBCLAVICULAR ARTERY AND VEIN

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It is difficult to treat AVM of extremities, and the recurrence rate after treatment is high. Herein, our experience of endovascular treatment of one case of stage III AVM involving the right subclavicular artery and vein is reported. An 80-year-old male was admitted to our hospital for progressive swelling of the right upper limb for 17 years. Sixteen months earlier he was diagnosed with AVM involving the right subclavicular

artery and vein. One covered stent (Fluency, 10 mm × 60 mm) was deployed endovascularly in the right subclavicular artery to block the main origins of those arteriovenous shunts (AVS). The patient's symptom was relieved postoperatively. Six months ago, his right upper limb began to swell again, and it progressed with time. One month ago, the swelling and pain in his right upper limb became intolerable, and he returned to our hospital. PE: vital signs were stable. His right upper limb was obviously swollen, there were dilated superficial vein and pigmentations in his right upper limb and chest wall. Ultrasound scanning and CT demonstrated that the covered stent in the right subclavicular artery was patent, there was chronic thrombosis in the proximal part of the right subclavicular vein, and there was still some AVS between right subclavicular artery and vein. He was scheduled to receive endovascular treatment. Intraoperative DSA showed that the covered stent in the right subclavicular artery was patent, there were several AVS distal and proximal to the stent, connecting the subclavicular artery and vein; the proximal part of the subclavicular vein (5 cm) was blocked. One covered stent (Fluency, 10 mm × 80 mm) was deployed proximal to the first stent with a small segment overlapping. Two AVS distal to the stents were embolised with coils. After the guide wire was passed through the occluded right subclavian vein, the occlusion segment was expanded with a 10 mm × 60 mm balloon, and a Fluency covered stent (10 mm × 60 mm) was deployed. Postoperative DSA demonstrated that the right subclavicular artery and vein were patent without stenosis, and most of the AVS disappeared. The patient's symptom of swollen right upper limb was relieved one day after operation. Postoperative anticoagulation was given with Rivaroxaban. He recovered smoothly and was discharged three days later. Four months after operation, his right upper limb is not swollen. Ultrasound scanning showed that all the stents are patent, and most of the chronic thrombus of the distal subclavian vein is recanalised with arteriovenous fistula. There is a higher incidence of right-sided congenital AVM of the proximal upper extremity compared to the left side, which may be related to the complexity of the embryological development of the right subclavian artery. The recurrence rate of AVM following surgery was reported to be 8.7% to 75%. In this case, the residual AVS after the first surgery and DVT in his right subclavicular vein contributed to the severe venous hypertension in the right upper limb. Endovascular treatments of both subclavicular artery and vein reduced the venous hypertension of his right upper limb effectively, and the patient is followed up continuously.

e-poster number 58

HOW TO MANAGE EARLY THROMBOSIS IN ILIOFEMORAL VEIN STENTS

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Due to rapid progression in venous stenting technology, the number of the procedures are growing fast. As venous stenting is usually a safe procedure with low morbidity, early stent failure is an infrequent event, and reports on the management are very few in the literature. Here we will discuss our over 10 years of experience in the management of early venous stent thrombosis beside a review of the literature.

e-poster number 59

HOW TO DECREASE THE EARLY THROMBOSIS RATE IN ILIOFEMORAL VEIN STENTING

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As awareness of venous occlusive diseases grows, new diagnostic modalities and interventional technologies are being used to keep veins open. In this paper we will review literature with respect to early iliofemoral stent thrombosis; we will also we will discuss our experience in technical and postprocedural considerations to reduce the chance of early reintervention in iliofemoral vein stenting.

e-poster number 60

DEEP VEIN BYPASS IN COMPARISON TO ILIAC VEIN ANGIOPLASTY/STENTING FOR ILIAC VEIN OCCLUSIONS – AN INDIAN PERSPECTIVE

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Objectives: Low morbidity in iliac vein angioplasty stenting for venous outflow lesions has been the "sweet carrot" for the actual patency rates and symptom-free patients. Patency rates for deep vein bypass have been quite similar to the endovascular procedures. However, in recent years, strangely, deep vein bypass has not been considered by vascular surgeons throughout the world. This study is an attempt to assess the patency rates and the clinical benefits of deep vein bypass in patients with iliac vein occlusion.

Material and methods: Forty-three cases of Iliac vein outflow obstruction were considered for this study. The patients underwent the procedure from October 2015 to December 2018. Thirty-eight cases underwent endovascular repairs, and five patients underwent deep vein bypass. Pre-op evaluation was performed with colour Doppler as well as CT/MR venography evaluation. Patients included in this study mainly had critical stenoses and short segment CTOs. Post-procedure follow-up included Doppler as routine, and in some cases venography was required.

Conclusions: In comparison to Iliac vein stenting, deep vein bypass has a similar rate of ulcer healing and a very similar patency rate of the treated iliac vein. Anticoagulation and patient compliance play an important role in achieving the desired results. Iliac venoplasty and stenting remains the primary mode of treatment in patients with iliac vein lesions. Dedicated venous stents have better patency rates. Palma's procedure is still the procedure of choice in deep vein bypass surgeries. Prosthetic grafts with a permanent AVF have better patency. Patients with worsening CVI and burnt out endovascular options definitely benefit from deep vein bypass.

e-poster number 61

BILATERAL IATROGENIC JUGULAR, SUBCLAVIAN, AND SUPERIOR VENA CAVA VENOUS OCCLUSION FOLLOWING REPEATED JUGULAR CANNULATION ASSOCIATED WITH ARNOLD-CHIARI MALFORMATION: SUCCESSFUL ENDOVASCULAR TREATMENT

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An Arnold-Chiari malformation is a congenital central nervous system defect in which the cerebellum structures are caudally displaced into the upper spinal canal. Raised intracranial pressure is commonly observed, and posterior decompression surgery is the treatment of choice. We present a patient with iatrogenic occlusion of the right and left jugular veins, right subclavian vein, and superior vena cava resulting from repeated central venous cannulations during long-term neurosurgical treatment. Due to venous hypertension, the patient suffered from persistent neurological symptoms including headaches, vision disturbances, and marked head oedema. Two stents were used to recanalise the right internal jugular vein and superior vena cava. Symptoms subsided and the patient returned to work. During a 24-month follow-up, the patient underwent CT angiography and CDD, which confirmed stent patency. The patient remains symptom free and continues working. The authors conclude that recanalisation of large central veins is gaining popularity because the outcomes are quite encouraging.

e-poster number 62

EXPERIENCE OF INTRAVASCULAR ULTRASOUND (IVUS)-GUIDED ILIAC VEIN STENTING FOR MAY-THURNER SYNDROME

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Objectives: Multiplanar venography for iliac vein stenting is limited by insufficient information for decision-making and malposition of the stent around a narrow lesion. Intravascular ultrasound (IVUS) is known to be effective in iliac vein stenting for May-Thurner syndrome.

Material and methods: This is a retrospective study from a prospectively registered database of patients, who underwent pharmacomechanical catheter-directed thrombolysis (PCDT) for acute iliofemoral DVT from April 2012 to Feb 2019. The treatment procedures and outcomes of patients who underwent PCDT under IVUS guidance were evaluated with EMR and PACS. IVUS was used to evaluate lesions after PCDT and to evaluate the location and position of the stent after iliac vein stenting.

Results: Nineteen patients from 117 patients were included in this study. There were eight men, and the mean age was 68.2 years. IVUS localised the location of a narrow lesion compressed by the iliac artery and vertebral body in 19 cases. There was one case with no localised narrow lesion in IVUS, which was observed without iliac vein stenting. IVUS found residual thrombus in three cases, which needed additional PCDT. The iliac vein stenting was done in 19 cases. The mean diameter of stent was 14 mm in common iliac veins. There was placement of one stent in 18 patients, two stents in one patient, and three stents in one patient. There was no post-procedural stent thrombosis. There was poor apposition of iliac vein stenting to the vein wall in one patient, which requires additional balloon angioplasty.

Conclusions: The IVUS can localise the narrow lesion in PCDT and measure the vein diameter for vein stenting and evaluate post-stenting wall apposition, which supports early technical success and possible long-term patency.

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e-poster number 63

MAY-THURNER SYNDROME – RESULTS OF ENDOVASCULAR INTERVENTION

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Objectives: May-Thurner syndrome is a condition in which the compression of the left common iliac vein by the overlying right common iliac artery causes venous blood outflow alteration from the left lower extremity resulting in chronic venous insufficiency in ipsilateral leg. Typical symptoms cover left sided lower extremity oedema, varicose veins, and deep venous recurrent thrombosis often followed by venous ulcer. Duplex-Doppler ultrasound examination and lower extremity deep venous angiography are regarded as the gold standard in its diagnosis. In the surgical treatment conventional open methods are gradually being replaced by endovascular procedures.

Material and methods: Eleven patients (nine female, two male, aged 22-59 years) were treated in our Department from 2014 to 2019. In eight cases iliac vein thrombosis and in three cases critical common iliac vein stenosis were diagnosed. All patients were treated with endovascular methods: balloon angioplasty with stent implantation (number of stents implanted ranged from one to five). Clinical outcomes of the treatment were assessed during 1-58 months of follow-up.

Results: Early good morphological and haemodynamic results were obtained in all nine (100%) patients. One patient required additional stent implantation (three stents) because of restenosis 21 days after initial procedure. In three other patients repeated endovascular procedures were performed because of stenosis recurrence after three months. In long-term observation, all stents were patent with good blood flow and resolution of symptoms (pain, oedema) with improvement of the quality of life was observed in 10 (90.9%) patients; one still suffers from venous claudication.

Conclusions: Venous compression syndromes can lead to DVT and significant morbidity. Venous balloon angioplasty and stenting is safe, efficacious, and durable in post-thrombotic patients. A combination of conservative and endovascular therapy provides the best treatment in most cases.

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e-poster number 64

PREVALENCE OF MAY-THURNER VARIANTS IN PATIENTS WITH SYMPTOMATIC MAY-THURNER SYNDROME

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Objectives: May-Thurner syndrome (MTS) is typically characterised by the compression of the left common iliac vein (LCIV) between the right common iliac artery (RCIA) and the fifth vertebra. Various types of May-Thurner variants (MTV) have been sporadically documented in case reports. This study aimed to identify the prevalence of MTV among the subset of symptomatic MTS.

Material and methods: Single-centre data of 173 consecutive patients presented with symptomatic MTS were reviewed from October 2004 to April 2018. MTS was diagnosed by computed tomographic venography. MTV was defined as: (i) compression of the LCIV by structures other than the RCIA or (ii) compression of pelvic veins other than the LCIV. MTV were categorised as: (i) LCIV compression group if the LCIV is compressed by structures other than the RCIA and (ii) non-LCIV compression group if the LCIV is not involved.

Results: Ten MTV were identified (5.8%), including five LCIV compression (category 1) and five non-LCIV compression (category 2). Patients' median age was 76 years (range, 51-94 years), male/female: 1/1, median follow-up was 388 days (range, 12-4694 days). All patients presented with deep vein thrombosis of the corresponding limbs. In category 1, the LCIVs were compressed by left common iliac artery (LCIA) (n = 2), huge myoma (n = 1), LCIA aneurysm (n = 1), and RCIA aneurysm (n = 1). In category 2, the right common iliac veins (RCIVs) were compressed by RCIA (n = 4) and L5 osteophyte (n = 1). Inferior vena cava filters were inserted in four patients. Endovascular management with balloon angioplasty and stent insertion were performed in six patients, three of each category. One patient underwent endovascular aneurysm repair for RCIA aneurysm. The remaining three patients received conservative treatment due to advanced age and comorbidities. Follow-up images were available for six patients, and all of them had patent venous outflow.

Conclusions: This study draws attention to the relatively high variant of symptomatic MTS population. Vigilance of different anatomical MTV is essential for correct diagnosis and treatment. Endovascular management is safe and effective and should tailor the lesion anatomy.

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e-poster number 65

UPDATE ON INTERNAL VEIN COMPRESSION

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Objectives: Therapy of venous insufficiency, formerly consisting mainly of surgery and textile compression, today includes also endovenous thermal ablation, sclerofoam, vein gluing, stenting, and various venotonic or anti-inflammatory medications. Because insufficiency usually goes along with vein dilatation, the idea to adjust dilated veins or valve zones by perivenous biocompatible gel injection was established by a Swiss work group in 2013; a potentially comfortable, fully vein saving, non-chemical method. Besides lots of known medical bulking agents like dextranomer, cellulose derivatives, and polyacrylate polyalcohol acrylates, the best choice for use in phlebology seemed to

be cross-linked hyaluronan, according to the huge experience with its biocompatibility. There are currently three options: 1) Percutaneous valvuloplasty (PVP), aiming at restoration of local valve function; 2) focal venoplasty (FVP), aiming at diameter reduction to modify haemodynamics; and 3) segmental venoplasty (SVP) to reduce diameters as an adjunct to endoluminal procedures.

Material and methods: PVP was studied in 25 patients (17 f, 8 m, age range 25-54 y, GSM valves, diameter 7.0-12.0 mm), using a 24 mg/l prototype hyaluronan. FVP was evaluated in 19 patients (13 f, 6 m, 26-69 y) for reflux reduction in GSV, SSV or sidebranch insufficiency (also 24 mg/l). SVP was investigated in 40 cases (23 f, 17 m, 41–72 y) with GSV or SSV insufficiency, adjunctive to Biomatrix sclerofoam (Venartis), using another, less viscous, and less durable hyaluronan (16 mg/l). For this collective, target segments were split and randomised to hyaluronan vs. NaCl 0.09%.

Results: PVP established orthograde flow in 24/25 cases (96.0%). With FVP, 16/19 cases were successful (83.3%) in obtaining alternate (n = 9) or orthograde flow (n = 7), correlating well with clinical improvement. In both applications, medical benefit was unchanged at six months FU. With SVP, technical success (> 50% lumen reduction) was obtained in all cases (40/40). In all hyaluronan compressed segments, there was no postinterventional pain or discomfort (FU eight weeks), compared to 36/40 cases (90%) after standard procedures. All hyaluronan applications were without adverse reactions.

Conclusions: PVP is effective and safe for restoration of valve function, and is suitable for early stages of valve decompensation. FVP for haemodynamic purposes showed feasibility, effectivity, and safety, while clear indications need further studies. SVP adjunctive to endovenous ablation significantly improves post-treatment comfort. The choice of hyaluronan instead of more permanent material is justified by the excellent safety results, although PVP and FVP might require maintenance injections in intervals of a few years. However, a mode including regular visits would allow individually tailored solutions instead of failing with "once forever" actions.

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e-poster number 66

ENDOVENOUS LASER ABLATION (EVLA) TREATMENT WITH A 1470-NM DIODE LASER FOR KLIPPEL-TRENAUNAY SYNDROME IN PAEDIATRICS: A CASE REPORT

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Objectives: Klippel-Trenaunay syndrome (KTS) is a very rare congenital disorder characterised by multiple varicose veins, venous and capillary malformations, and hypertrophy of soft tissue and bone. Endovenous laser ablation (EVLA) is a new, minimally invasive surgery method. The aim of this study was to evaluate the outcomes in KTS paediatric patients who had undergone 1470-nm EVLA treatment, to provide standards for comparison with conventional therapy.

Case presentation: The patient was an 11-year-old boy who presented for medical care from the peripheral area after being referred to Universitas Airlangga Teaching Hospital. Symptoms were pain and swelling in the right leg for the previous six years with many lumps appearing around the leg. At birth, the patient was within normal limits. There was no family history of a genetic disorder. He is currently being treated by conventional therapy in the form of a compression stocking and anti-inflammatory dressings on the affected limb. The patient has been on medical compressions for the past two years. Physical examination found unilateral swelling in the right lower extremity with multiple lipodermatosclerosis patches and various sizes of superficial varicose veins. The diagnosis was made by the clinical findings and supported by Doppler ultrasonography studies of the lower limb vessel and tissue. After being evaluated with a vein specialist in Universitas Airlangga Teaching Hospital, the maximum diameter of dilated venous was 2.3 cm, and the patient was scheduled to have serial EVLA rather than conventional open surgery. He has undergone EVLA with a 6-fr fibreoptic 1470-nm diode laser inserted through the great saphenous veins. Laser power was set on 10 W / 140 J for the upper knee and reduced to 8 W / 140 J for the lower knee. The outcome under Doppler ultrasonography follow-up studies showed that the vein diameter was reduced and the patient feels fewer symptoms.

Conclusions: This is a case of KTS presenting in a paediatric patient, and due to its rarity in Indonesia this report can increase awareness and evaluate the outcome of new treatment by minimally invasive endovenous laser ablation compared to conventional therapy.

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e-poster number 67

ENDOVASCULAR INTERVENTIONS OF DIALYSIS ACCESS IN THE ERA OF NEW ENDOVASCULAR DEVICES: A SINGLE-CENTRE EXPERIENCE

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Objectives: Dialysis access trouble-shooting causes a large number of admissions and imposes a considerable cost on both patients and healthcare systems. The reasons of access site failure include, neointimal hyperplasia, outflow tract remodelling and fibrosis, and multiple catheterisation of central veins. Drug-coated balloons, high-pressure balloons, high radial force self-expanding stents, and covered stents have been shown to have a good long-term access failure-free survival after first intervention in previous studies. The aim of this study is to evaluate the effect of endovascular treatment on dialysis access durability in the era of new endovascular devices.

Material and methods: Patients who underwent endovascular treatment for dialysis access failure, including arterio-venous fistula, arterio-venous graft, and central vein catheters, from October 2016 to March 2018, were enrolled in the study. Procedural and follow-up data were gathered and analysed.

Results and discussion: Within 17 months, 47 endovascular procedures were performed. Among them, 37 (78.7%) procedures were conducted as de novo procedures, and the rest were re-interventions. All re-interventions were conducted on cases with central vein stenosis or occlusion (10 [21.2%] procedures). The usage of drug-coated balloons on outflow obstruction improves venous limb outflow patency rates. However, given the similar pathophysiology of obstruction of central veins in access circuits with an outflow limb and the absence of an appropriately sized drug-coated balloon in cases with central vein obstruction, the rate of restenosis and resultant re-intervention in this area remains high.

Conclusions: The re-intervention rate is higher in central vein obstruction among patients with dialysis access. Higher rates of flow and previous catheterisations cause intimal hyperplasia and vascular remodelling. Newer devices, including larger drug-coated balloons, may reduce the rate of re-interventions in these lesions.

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e-poster number 68

TREATMENT OF CONGENITAL VASCULAR MALFORMATIONS

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Objectives: Peripheral vascular malformations are congenital lesions that cause functional and aesthetic impairment, requiring a multidisciplinary approach with modern diagnostic and therapeutic techniques. Containing arterial, venous, and lymphatic components, featured with unpredictable clinical course, with a high recurrence rate, and an influence on the cardiovascular system, they require extensive treatment.

Material and methods: Fifty-three patients with congenital vascular malformations (18 males, 35 females) aged 14.2-59.9 years were treated between 2002 and 2018 in our department. Seven patients underwent previous surgical treatment with the ligation of malformation supplying vessels that did not contribute to any reduction of the lesion. Physical examination, duplex-Doppler examination, and angio-CT scan were routinely performed before procedures as well as during planned fol-

low-up visits at periodic intervals. In concrete cases MRI scans were additionally performed. Treatment inclusion criteria covered: pain, swelling, ulceration or bleeding, organ malfunction, and disfiguring lesion. In the vast majority of patients, endovascular procedures (embolisation and sclerotherapy) were performed while five of the patients underwent combined procedures including embolisation, sclerotherapy, and surgery. Embolisation procedures were performed with the use of commercially available agents – 95% ethyl alcohol, ethylene vinyl alcohol copolymer (Onyx), synthetic surgical glue (Glubran), polidocanol, polyvinyl alcohol (PAV), Histoacryl, and bleomycin. Clinical outcomes of the treatment were assessed during 4-162 months of follow-up period.

Results: Immediate good morphological and haemodynamic results were obtained in all 53 (100%) cases, clinical success (which is very difficult in assessment) was achieved in 52 (98.1%) patients. One patient required above-knee amputation 10 years after the beginning of treatment. Complications appeared in three patients: peroneal and tibial nerve palsy in the first patient, hand phlegmon in the second, and necrosis of the face soft tissues in the third. The vast majority of patients remained asymptomatic (or the symptoms were significantly reduced) during the follow-up period.

Conclusions: 1. Therapy of vascular malformations remains a challenge. 2. Surgical operation should not be the first line of treatment of vascular malformations. 3. Embolisation with alcohol is now considered as the first line of treatment in the overwhelming majority of cases. 4. Patients suffering because of vascular malformations should be scheduled for a particular sort of treatment according to the individual clinical picture and symptoms.

e-poster number 69

INCIDENCE OF VENOUS THROMBOEMBOLISM AND D-DIMER LEVEL IN PATIENTS WITH CARDIAC IMPLANTABLE ELECTRONIC DEVICES

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Objectives: To assess the incidence of venous thromboembolism (VTE) and D-dimer level in patients with cardiac implantable electronic devices (CIED).

Material and methods: The study included 130 patients (67 males), mean age 69 years (60-76). Group A included 100 patients with indications for transvenous pacemaker implantation. In 40% of cases the indication for implantation was atrioventricular block, in 35% cases – atrial fibrillation with significantly impaired atrioventricular conduction, in 24% of cases – sick sinus syndrome, and in 1% of cases – carotid sinus syndrome. Physical examination, duplex ultrasound (DUS) of the upper and lower limb veins, and venous blood collection to evaluate the D-dimer level were performed in group A at admission, one, six, and 12 months after operation. Group B included 30 patients without indications for implantation; the same examinations were performed on them at admission.

Results: In group A vein patency was confirmed by physical examination and DUS at admission, 43 single-chamber and 57 dual-chamber pacemakers were successfully implanted. Lead implantation was performed through the cephalic vein in 87 patients, through the subclavian vein in nine patients, and through the major pectoralis muscle veins in four patients after failed subclavian access. VTE incidence was 10%. In six cases DUS identified occlusion of the subclavian vein, in two cases – occlusion of the cephalic vein, in one case – lower extremity deep veins thrombosis, and in one case – thrombosis of an additional great saphenous vein. Eight cases of VTE were symptomatic, and one case of subclavian vein thrombosis and one case of additional great saphenous vein thrombosis were completely asymptomatic. D-dimer level at admission was 300 (275-1000) μg/l DDU, one month after operation – 500 (300-680), six months after – 300 (250-500), and 12 months after – 300 (300-500). Significant changes were obtained for D-dimer level before and six months after operation (p = 0.014) and one and 12 months after operation (p = 0.007). D-dimer level before and one month after operation correlated with age of patients (r = 0.372 and r = 0.313). In group B the D-dimer level was 250 (250-300) μg/l DDU, and statistically significant differences were obtained in comparison with group A D-dimer level at admission (p = 0.009), one month (p = 0.002), and 12 months (p = 0.007) after operation. Patients with dual-chamber pacemakers had increased level of D-dimer one month after operation (p = 0.011). Patients with atrioventricular block had higher level of D-dimer before (p = 0.016) and one month after operation (p = 0.004) compared with patients with atrial fibrillation. Patients with VTE before pacemaker implantation had increased D-dimer levels compared with other group A patients (p = 0.028) and group B patients (p = 0.006).

Conclusions: The incidence of VTE in CIED patients was 10%. D-dimer level increased one month after operation, then decreased at six and 12 months. Patients with VTE had higher D-dimer level before operation. Patients with dual-chamber pacemakers and patients with atrioventricular block had increased D-dimer level, which may indicate a procoagulative state in this group of patients.

e-poster number 70

STUDY OF PREVALENCE OF DEFICIENCY OF PROTEIN C AND PROTEIN S LEVELS IN PATIENTS WITH DEEP VEIN THROMBOSIS IN NORTH INDIA

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There is high incidence of deep vein thrombosis (DVT) after major surgeries, especially gynaecological, orthopaedic, and pelvic surgeries. Important thrombophilic factors associated with deep vein thrombosis are the deficiency of protein C and protein S. Hence, this study was conducted in 50 patients divided in two groups: 40 patients in group A having DVT proved on oclour Doppler; and 10 control patients in group B, not having any venous disease, and the prevalence of protein C and protein S deficiency was studied in the northern region of India. In Group A, there were 17 patients out of 40 (42.5%) who had decreased protein C levels, while in group B there was one patient out of 10 (10%) who had decreased protein C levels. The odds ratio proved to be 7.30. The prevalence of protein C deficiency was greater in group A patients, and it was statistically significant. In group A, there were five patients out of 40 (12.5%), who had decreased levels of protein S, while in group B there was no patient with decreased levels of protein S. Odds ratio was 5. The prevalence of protein S deficiency was more in group A patients, but it was not statistically significant. In the present study the higher prevalence rates of protein C and S deficiency may be due to regional or racial differences showing a high prevalence in the Indian population as compared to Western populations. Hence, in all patients of unprovoked DVT and especially proximal DVT estimation of protein C and protein S levels should be performed because these patients may require anticoagulation for a longer period.

e-poster number 71

EFFICACY OF INTEGRATED MINIMALLY INVASIVE TREATMENT FOR ILIAC VEIN COMPRESSION SYNDROME WITH VARICOSE VEINS OF LOWER EXTREMITIES

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Objectives: To analyse the efficacy of integrated, minimally invasive surgery for iliac vein compression syndrome with varicose veins of lower extremities.

Material and methods: From January 2017 to January 2018, 11 patients with iliac vein compression syndrome accompanied by varicose veins of lower extremities underwent left iliac vein stent implantation and radiofrequency thermal ablation of lower extremity veins in the First Affiliated Hospital of Zhejiang University School of Medicine. The left iliac vein stent was implanted through the puncture point approach of the main great saphenous vein, and then radiofrequency thermal ablation of the maim saphenous vein was performed. Rivaroxaban and aspirin were administered from the day of surgery for six months and 12 months, respectively. After discharge, patients were followed up for

more than six months. The lower extremity veins and iliac veins were re-examined by Doppler ultrasound or CT angiography at two weeks, two months, and six months after surgery, respectively.

Results: All the 11 patients were operated successfully without complications, and they were followed up for six months. The rates of soreness and swelling remission, and the iliac vein stent patency were 100%. No varicose vein recurrence, iliofemoral vein thrombosis, or pulmonary embolism were found.

Conclusions: Integrated minimally invasive surgery is safe, effective, and less invasive for iliac vein compression syndrome with varicose veins of lower extremities.

e-poster number 72

ASSESSMENT OF THE CROSS-SECTIONAL AREA OF THE INFERIOR VENA CAVA ACCORDING TO THE DATA FROM MAGNETIC RESONANCE VENOGRAPHY

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Objectives: Nowadays there are few descriptions of MRI anatomy of the veins of the retroperitoneal space. The definition "norm" is vague because of the specifics of every human body. The aim of this study was an assessment of the area of the inferior vena cava in different clinical conditions.

Material and methods: The examination included 220 patients, 82 of whom were chosen. They had signs of chronic venous disorder of the lower limbs. The examination was conducted in two centres on GE 1.5T and Philips 1.5T magnetic resonance imagers. Contrast enhancement was not applied.

Results: There were 32 men under examination. According to the CEAP classification, two of them were clinical class C1, the average age (AA) was 38 years, the average area of the inferior vena cava (IVC) was 292.05 ±188.7 (CI 103.35-480.75). There were nine patients with class C2, the AA was 31 years, the average area of the IVC was 196.18 ±177.9 (CI 18.28-374.08); four patients with class C3, the AA was 36 years, the average area of the IVC was 223.93 ±184.35 (CI 39.58-408.28); 13 patients with class C4, the AA was 46 years, the average area of the IVC was 223.93 ±184.35 (CI 39.58-408.28); four patients with class C6, the AA was 47 years, the average area of the IVC was 289.87 ±196.7 (CI 93.17-486.57). There were 50 women under examination. Among them 10 patients with clinical class C1, the AA was 32 years, the average area of the IVC was 27.84 ±183.7 (CI 44.14-411.54); 8 patients with class C2, the AA was 42 years, the average area of the IVC was 198.91 ±188.5 (CI 10.41-387.41); 15 patients with class C3, the AA was 53 years, the average area of the IVC was 234.69 ±182.4 (CI 52.29-417.09); 11 patients with class C4, the AA was 62 years, the average area of the IVC was 273 ±182 (CI 91-455); three patients with class C5, the AA was 63 years, the average area of the IVC was 239.23 ±183.7 (CI 55.53-422.93); three patients with class C6, the AA was 68 years, the average area of the IVC was 189.13 ±186.4 (CI 2.73-375.53). This data similar to the results published in India in 2016 show 4126 people examined via ultrasound method. The average diameter of inferior vena cava on a breath was 1.04 cm (SD 0.22; range 0.46-1.54); on the exhale – 1.69 cm (SD 0.37; range 0.97-2.26).

Conclusions: The cross-sectional area of the inferior vena cava and its main tributaries was from 114.08 ±113.68 to 292.05 ±188.7, according to the data from magnetic resonance venography, and it depended on the severity of the venous outflow disorder.

e-poster number 73

ILIAC VEIN STENTING IN A PATIENT WITH SYMPTOMATIC LOWER EXTREMITY SWELLING RESULTING FROM DIFFUSE PELVIC MASS

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Objectives: Chronic venous occlusion and lower limb swelling due to iliac vein compression resulting from pelvic masses and lymphadenopathy is of potential clinical interest. Symptomatic limb welling and venous ulcers necessitate venous intervention to alleviate associated symptoms.

Case presentation: A 66-year-old patient with a history of previous papillary urothelial carcinoma of the bladder was referred to our vascular surgery clinic. The patient underwent radical cystectomy and ureterostomy seven years earlier. Recurrence of malignancy occurred five years after the operation. The patient had a mass at the right side of the pelvis compressing the external iliac vein on magnetic resonance imaging. The patient also had diffuse lung metastasis on lung computed tomography. The patient had received 12 courses of chemotherapy. Left lower extremity had severe swelling. Above the knee and thigh of the affected limb had larger diameter (6.5 and 9.5 cm, respectively) than the contralateral limb. The patient suffered from right lower extremity pain and had a venous ulcer at right medial malleolus. We performed venography to reveal the underlying cause of venous stasis in the right lower extremity. We did the imaging in a prone position. A 5F sheath was introduced through the right popliteal vein. The external iliac vein had severe stenosis, and invasion of pelvic mass into the vein was evident. We moved the patient to the supine position to cannulate the right superficial femoral vein (SFV). An 8F sheath was introduced into the SFV by ultrasound guidance and Seldinger technique. A repeat venogram was obtained and similar results were found. Venography was repeated at 45 and 90 degrees left lateral oblique views and severe stenosis and tumour invasion were confirmed. A 0.035 hydrophilic standard guidewire was introduced through the sheath and the stenosis was crossed. Then a 40 mm length × 90 mm diameter CONQUEST balloon (BARD) was introduced over the guidewire. Venoplasty of the external iliac vein was conducted. Then a venous stent of 80 mm length × 12 mm diameter (VENOVO, BARD) was introduced over the guidewire and deployed in the external iliac vein with the stenosis trapped inside the length of the stent. The complete venogram illustrated dilatation of the stenosis and anatomical passage of contrast material through the external iliac vein. Then a 40 mm length × 120 mm diameter CONQUEST balloon (BARD) was introduced over the guidewire. Balloon dilatation was done through the stent and its proximal and distal landing zones. The patient was followed after three and six months. Swelling of the right lower extremity had resolved dramatically, and the venous ulcer at right medial malleolus had healed.

Conclusions: Endovascular venous recanalisation of iliac veins is feasible and safe in patients with unresectable and diffuse pelvic masses. Although recurrence of stenosis is possible, quality of life and symptom relief is of potential clinical value in affected patients.

e-poster number 74

APPLICATION FOR ANALYSES OF VCSS, CEAP, AND PHLEBOGRAM IMAGE STORAGE

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The compilation of data in the modern phlebological clinic requires not only the simple writing of the clinical findings but also the use of quality-of-life scores and severity of symptoms as well as classifications that facilitate the analysis of results and the proper stratification of the disease. The growing need for records has been contributing to the increase of time spent in service, representing a greater demand for work and financial. Since the year 2017 we have been developing an APP for the compilation and search of data related to Venous Clinical Severity Score and Clinical, Aetiological, Anatomic, Pathophysiological score, and to record images of venous ultrasound mapping. This project has been developed in four stages: 1. Research and development of a paper model and pilot test compiling data in service protocol; 2. Development of a beta application on frame work x-code; 3. Validation test of this model; and 4. Integration of the application with the patient's electronic medical record system through an interface via web service. The application will save time and random data searches for both research development and clinical evaluation of evolutionary parameters. At the time of submission of this abstract the project is in phase three.

e-poster number 75

PREVALENCE AND RISK FACTORS OF VARICOSE VEINS IN ADULT LOWER LIMBS IN THE JINZE TOWNSHIP OF SHANGHAI

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Objectives: To estimate the morbidity and risk factors of varicose veins (VVs) in adults of Jinze Township of Shanghai.

Material and methods: A multistage random sampling method was employed to investigate 2100 local residents aged over 18 years from Jinze Township, followed by a questionnaire survey and physical examination, which mainly referred to the prevalence and risk factors of varicose veins in adults of Qingpu District of Shanghai.

Results: A total of 2048 valid questionnaires were collected from 1069 females and 979 males. The prevalence rate of VVs was 10.5% (216/2048): 11.0% (108/979) in males and 10.1% (108/1069) in females. Age, average standing time per day, hyperlipidaemia, and family history of VVs were risk factors in the prevalence of VVs based on the results of multiple logistic regression analysis.

Conclusions: The prevalence of VVs in adults of Jinze Township, Qingpu District of Shanghai was at a high level. The results indicate that great importance should be attached to those with family history of VVs, hyperlipidaemia, or strenuous manual labour.

e-poster number 76

THE VALUE OF CFV DISTENSIBILITY IN SONOGRAPHIC ASSESSMENT OF CHRONIC VENOUS DISEASE

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This prospective study is being performed to define the range of distensibility for the common femoral vein and its importance in correlation with other sonographic findings in chronic venous disease.

CFV distensibility was measured by ultrasoundusing standard Valsalva manoeuvre in the supine position.

e-poster number 77

CORRELATION BETWEEN ECHOGRAFIC PATTERNS AND CEAP GRAVITY IN THE VENOUS INSUFFICIENCY OF LOWER MEMBERS

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Objectives: The aim of the study was an assessment of the correlation between the clinical parameters such as the CEAP classification during the vascular consultation and anatomical as well as ultrasound compromise of the great saphenous veins (GSV), small saphenous veins (SSV), perforator veins (PV), and tributary veins (TV) in the evaluated patient. The study was performed to establish a relationship of severity between ultrasound pattern (venous mapping) and CEAP classification.

Material and methods: A prospective study was carried out that included 626 patients, who, after being consulted and having the respective Doppler, were classified according to their most frequent ultrasound diagnosis. Only patients presenting CEAP greater than or equal to class III were included in the present study. We used the first three ultrasound diagnoses to classify patients.

Results: The most common ultrasound finding was GSV incompetence (IGSV) (53%) followed by small saphenous vein incompetence (ISSV) (23.3%). In the second group of the diagnoses, an incompetence of the PV (33%) followed by ISSV (23%) was found, and IPV (16%) followed by lymphangiosclerosis 7% for diagnosis group 3 was recognised. Analysing CEAP Classification vs. Diagnosis 1, 2, and 3, we documented a statistically significant relationship between CEAP class III, IV, V, VI and IGSV, because the frequency of IGSV occurrence was higher. For Diagnosis 2 a statistically significant relationship is greater for CEAP IV, V, VI and IVP (leg perforator incompetence) and ISSV (proximal reflux). For Diagnosis 3 we see that there is a statistically significant association between CEAP IV, V, VI and the ultrasound diagnosis of lymphangiosclerosis and perforator vein incompetence. The diagnosis of IVP together with ISSV and lymphangiosclerosis each have a greater statistical relation when we speak of gravity CEAP (IV, V, VI) and distal tributary drainage in IGSV.

Discussion and conclusions: We can establish a relationship of the disease seriousness when analysing the CEAP, and we can even deduce the commitment of larger calibre veins only letting us guide by ectoscopy.

e-poster number 78

STANDARDISATION OF ANATOMICAL MEASURES BY ULTRASOUND OF THE SURFACE VENOUS SYSTEM OF LOWER LIMBS IN MEXICAN PATIENTS

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Objectives: The present work aims to describe, capture, and present some anatomical measurements of the vessels that make up the superficial venous system by means of an ultrasound study. It has been proposed that the study be carried out in the Mexican population at a national level, comprising both sexes and persons age between 18 and 60 years and, as a special requirement, who are healthy or without knowledge of chronic pathological changes. This information will be combined with different catches of other cities of the country of Mexico, being called north, south, east, and west, in order to obtain parameters of vascular measurement of the superficial venous system of Mexican people.

Material and methods: The sample consisted of 300 patients who underwent a Doppler ultrasound study of both lower extremities; 600 studies were performed. The superficial venous system was evaluated by ultrasound, and seven venous measurements were taken in the following anatomical sites: great saphenous vein at the saphenous junction femoral, 1 – ostial valve (terminal), 2 – periosteal valve (preterminal), 3 – thigh in middle third, infra patellar, 4 – middle, 5 – distal (supra malleolar), small saphenous vein, 6 – ostial valve (terminal) at the sapheno-popliteal junction, and 7 – in its middle third.

Results: Measures in the diameter of the major saphenous vein, including the lower limb segments (leg, thigh, and groin), as well as the small saphenous vein, in Mexican and clinically healthy populations, concur that the mean is within the lower limits found and reported by researchers in international literature.

Conclusions: This information will be compared with the results from other cities in the country collected within one more year (September 2019) in order to obtain vascular measurement parameters of the superficial venous system of inferior members of Mexican people.

e-poster number 79

THERMOGRAPHIC EVALUATION OF THE EFFICACY OF A COMBINATION OF DIOSMINE, ESPERIDINE AND RUSCOGENIN (MIOVEN700®) IN PATIENTS WITH CHRONIC VENOUS DISEASE (CVD)

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The aim of this study was to evaluate the clinical improvement of CVD patients using thermography, comparing changes in thermal curves with the progressive disease's enhancement of signs and symptoms. A lot of scientific evidence shows how flavonoids are effective for the treatment of CVD; however, in all of these the effectiveness was measured through the evaluation of signs and symptoms with a compilation of questionnaires submitted to patients. Thermography has already been used for the estimation of primitive chronic venous pathologies of the lower limbs, associated with superficial vein insufficiency, and has proved to be an innovative method, very useful in the medical diagnosis of these pathologies. The current study was performed using a Flir E753 thermal imaging camera. Images of the lower limbs showed that patients suffered from venous disease characterised by a higher skin temperature associated with pathological changes in veins related with blood stasis, inflammatory states, and swelling. The observational study was conducted in four centres on patients assigned to classes C0 to C3 based on the CEAP clinical classification. Patients were separated into two groups: those treated for three months with 1 cpr/die of nutraceutical Mioven700® (Diosmine 500 mg, Esperidine 90 mg, Ruscogenin 100 mg) and with elastocompression (as per guidelines); and those subjected only to elastocompression. During the enrolment phase the CEAP clinical class was assigned and the first thermographic evaluation was performed. The parameters were re-evaluated at 30 days (T1). A final evaluation will follow at the end of the treatment at 90 days (T2). The table of acquired images shows a comparison, for different regions of interest, of the cutaneous temperature distribution at the T0 and the T1 evaluation for a randomly chosen representative subject. The thermal images are displayed in both greyscale and iron scale, in the temperature range from 25°C to 35°C. The qualitative inspection of the thermal images highlights a sharper definition of the thermal track of the vessels at T1 with respect to T0. Such a process can be better appreciated at the iron colourmap presentation, especially for the left and the posterior views of the leg. In the left view, the reduction of the thermal track for the upper vessel is particularly evident. Such a process in T1 is suggestive of a better vasomotor control, with a higher sympathetic vascular tone, probably combined with a better flow control in the subcutaneous vascular network, both venous and arteriolar. Thermal imaging provides an immediate visualisation of the vascular changes through their effect on the thermal imprint of the vascular network. Even though this report deals only with a preliminary qualitative analysis of a representative subject, the digital thermal images can be further processed to get into statistical analysis of the temperature changes along the vessel network. Preliminary results show that patients treated with a nutraceutical Mioven700® and with elastocompression exhibit a better vasomotor control than the group without nutraceutical; further data will be needed to confirm these results.

e-poster number 80

CHARACTERISTICS OF CHRONIC VENOUS DISEASE WITH PULSATILE DOPPLER WAVE OF VENOUS FLOW

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Objectives: Pulsatile Doppler flow of leg veins with chronic venous disease is sometimes detected. Chronic heart failure with tricuspid valve reflux, arteriovenous fistula, and venous stasis are considered as causes of the pulsatile flow of leg veins. This study is conducted to identify the characteristic of chronic venous diseases with the pulsatile Doppler flow of leg veins in our institute.

Material and methods: Twenty cases (C2: 2, C3: 13, C4a: 3, C4b: 1, C6: 1) with pulsatile Doppler forward flow of leg veins were investigated from 2896 records (1468 cases) of ultrasound examination for chronic venous diseases in our institute for three years. The forward Doppler flow detected duplex ultrasound in a sitting position were assessed at common femoral vein to calf vein, saphenous veins, and perforators.

Results: Over all the sites of detected pulsatile Doppler forward flow was from common femoral to tibial vein, great saphenous vein and thigh and calf perforators. Pulsatile Doppler forward flow was detected at deep vein in 11 cases (six cases bilateral), at deep veins + saphenous vein in four cases (two cases bilateral), at saphenous vein in three cases, at deep vein + perforator in one case, and at perforator in one case. The shape of pulsatile Doppler waveform was classified as 14 complete pulsatile and six pulsatile with continuous wave. In the background of cases with pulsatile Doppler forward flow of leg veins, 10 cases had NYHA category 2 chronic heart failure, five cases had post thrombotic syndrome (no construction of arterio-venous fistula), three cases had post-operative status of endovenous ablation, three cases had thrombophlebitis, and one case had a history of leg injury. All cases detected pulsatile with continuous waveform in leg vein had venous thrombosis or post-endovenous ablation without chronic heart failure.

Conclusions: The cause of pulsatile Doppler forward venous flow in cases with chronic venous disease may be arterio-venous fistula by venous thrombosis and post endovenous ablation in addition to chronic heart failure with tricuspid valve reflux.

e-poster number 81

C0-C1: WHAT IS HAPPENING PRIOR TO THE SYMPTOMS?

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Objectives: Because earlier ultrasound investigations do not reveal relevant vein damage in most CEAP C0-C1 cases, there is little insight into the pathomorphology and pathophysiology of early stages of valve malfunction. Most of the explanations of venous insufficiency are derived from studies of later stages, CEAP C2-C6. Therefore, venous insufficiency is still misinterpreted as being chronic and incurable. Better knowledge should come from studies on the very early stages.

Material and methods: In a prospective study in young patients, 4-30 years of age (n = 482, 297 f, 185 m, mean age: 17.3 y), 660 cases (legs staged CEAP C0-C1) were collected from consecutive candidates presenting due to: A) invitation (4-18 y, Berlin kids study, n = 220); B) aesthetic vein issues (reticular veins, n = 110 or telangiectasia, n = 110, 18-30 y/o); or C) contralateral C2 vein issues (n = 220, 18-30 y/o). High-resolution transcutaneous ultrasound analysis (16-23 MHz) of vein valves was performed, with a focus on valve lesion analysis in saphenous veins, perforators, and tributaries; source determination of spider veins and reticular veins; measurements of vein diameters, flow, and reflux.

Results: Relevant valve damage concerning saphenous veins was found in 280/660 legs (42.4%), CEAP C0: 163/354 legs (46.0%), and in 115/306 legs (37.6%) staged C1. In the age group of 4-18 years, 36.8% (81/220) of the legs had relevant valve lesions, 97.5% of these (79/81) were asymptomatic. In the age group of 19-30 years, 45.2% of the cases (199/440) had relevant valve lesions, 96.5% of these (192/199) were asymptomatic. Comparing the two age groups (4-18 vs. 19-30), relevant reflux was related to a single failing valve (42/81, 51.9% vs. 83/199, 41.7%), two valves (24/81, 29.6% vs. 67/199, 33.7%), three valves (11/81, 13.6% vs. 35/199, 17.6%), or four or more valves in a row (4/81, 4.9% vs. 14/199, 7.0%). Deterioration occurs due to pressure-induced valve decompensation. Stasis-related valve destruction was not observed in both age groups, and indicators (permanent sinus aggregates) were rare (4-18 y.: 3/81, 3.7%, 19-30 y.: 19/199, 9.5%). The source of reticular veins and telangiectasias (largest spot) were saphenous veins (41/220, 18.6%), tributaries (54/220, 24.5%), or perforators (125/220, 56.8%).

Conclusions: Relevant vein disease is present even in the youngest and asymptomatic parts of the population, presumably due to embryonic valve lesions and pressure-related deterioration. C0-C1 is not a small vessel disease, although small vessels may be involved. The definition of CEAP stages C0/C1 is greatly misleading because it denies major vein damage, which clearly exists. In future, there should be no better way to improve patients' fates more effectively than by detecting early stages and by preventing C2-C6 stages with novel, cost-effective strategies

e-poster number 82

NEW ULTRASOUND MARKERS OF CRITICAL VENOUS HAEMODYNAMICS

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Objectives: Using novel high-resolution ultrasound systems (HRU), valvular structures, and low-flow microaggregates may be depicted today in a more detailed way. We recently reported the existence of motion-resistant particle aggregations within valve sinus, which are neither sludge nor thrombus, called motion-resistant aggregates (MRA). This consecutive prospective study compares valve structures, cusp motility, and extent of aggregates, resulting in a new approach to vein damage classification.

Material and methods: In 500 consecutive patients (322 f, 178 m; 24-68 years old, GSV, SSV; C0-C6) presenting with unilateral epifascial venous insufficiency > C2, more than 6800 saphenous vein valve locations were examined with high-resolution ultrasound (14-23 MHz, peak up to 32 MHz, Vevo MD). Video recordings (manual 3-D scans) were collected for review and analysis by five experienced ultrasound investigators.

Results: Comparing repetitive patterns of valve formation, six different stages of valve changes were determined: 1) Alteration of sinus haemodynamics, marked by reduction of flushed sinus volume, was the most frequent finding (59.4%); 2) Restriction of cusp function due to aggregates but maintained valve closure was seen in 34.5% of the cases. Rare findings, correlating with short periods of occurrence, were; and 3) total fixation of cusps without reflux (3.1%), followed by stage 4 with initial onset of reflux (4.2%). Cases with increased reflux showed reduction of aggregates and progressive valve degeneration (5) and finally loss of valve structures. All cases were related to particularly low flow (mean < 3 cm/s).

Conclusions: Motion-resistant blood cell aggregates at the valve sinus indicate successive stages of venous insufficiency, correlating with specific conditions of cusp motility, shape, and flow. Knowledge of these consecutive stages provides a new basis to evaluate the effectivity of preventive measures, potentially effective in stages 1-4, and vein preserving strategies. Updates will be presented.

e-poster number 83

FUNCTIONAL ANATOMY OF THE SEMIMEMBRANOSUS MUSCLE: MAIN THIGH PUMP AND DERIVATIVE ROUTE OF THE HUNTER'S CANAL

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Objectives: To highlight the role of the semimembranosus muscle, which is surprisingly not described in the major books of anatomy, as the main thigh pump in venous return.

Material and methods: Latex injection of fresh cadavers followed by anatomical dissection and coloured segmentation of the whole venous network of 300 lower limbs and 3D reconstructions by CT venography of 1000 CVD patients are the basis of this study.

Results: The venous arcades of the semimembranosus muscle constitute a main deep collateral route by-passing the narrowed area of the Hunter's canal. This anatomical study clearly shows that these venous arcades are regularly connected: 1) By their two lower branches to the popliteal vein; 2) By their two higher branches to the deep femoral vein. Consequently, they constitute a derivative route of the femoral axis, explaining their dilatation in the case of stenosis of the Hunter's canal outlet: the venous arcades then play the role of a safety valve. Moreover, the veins of the semimembranosus muscle constitute a main thigh pump: they push the blood up towards the femoral crossroad at the root of the limb.

Discussion and conclusions: The veins of the semimembranosus should be systematically investigated by USD; their dilatation is evidence of venous outlet syndrome of the Hunter's canal, which is a major cause of femoral vein thrombosis. USD investigation should be systematically carried out at that level to prevent future deep vein obstruction.

References: Uhl J.F, Gillot C. Anatomy of the veno-muscular pumps of the lower limbs. Phlebology 2015; 30: 180-193.

e-poster number 84

THE PATTERN OF REFLUX AND ITS CORRELATION WITH CLINICAL SEVERITY OF DISEASE IN VARICOSE VEINS IN THE INDIAN POPULATION

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Objectives: The present study was done to see the pattern of reflux in patients with varicose veins, and its correlation with clinical severity of disease and risk factors in the Indian population.

Material and methods: The prospective study included 100 patients of varicose veins, evaluated clinically for e of risk factors, and the reflux pattern was studied using colour Doppler. Clinical status was characterised by the CEAP classification. The clinical severity was grouped into two categories: mild to moderate CVI (C1-C3) and severe CVI (C4-C6). The pattern of reflux and its correlation with severity of disease and risk factors was studied.

Results: The most common risk factor in females was previous pregnancy, while in males it was prolonged standing. Increasing age was found to be associated with clinically more severe form (C4-C6) of disease. The majority of cases (74%) had mild to moderate CVI. The most common pattern of reflux found was saphenofemoral junction (SFJ) incompetence in 70% cases. It was found that the presence of combined SFJ and SPJ reflux increased the chances of severe disease by 1.94 times when compared with isolated SFJ reflux. There was statistically significant correlation between long duration of standing with deep venous reflux and further development of a severe degree of CVI.

Conclusions: Prolonged standing was found to increase the chances of deep venous reflux, which was in turn correlated with a severe form of CVI. Old age was also associated with a severe form of disease.

e-poster number 85

A NOVEL SIGN IN PATIENTS WITH VARICOSE VEINS

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Objectives: In the absence of trauma, haematological disease, and anti-platelet use, no attention has been paid to elucidate the mechanism of ecchymosis. It has come to our attention that ecchymosis on a lower limb might be a sign of varicose vein. Accordingly, we aimed to analyse and describe the frequency of leg symptoms and the presence of ecchymosis in patients with varicose vein.

Material and methods: Five hundred and seventy-four patients who had been diagnosed as having varicose vein or chronic venous insufficiency either by clinical examination or Doppler ultrasonography were included in the study. Leg symptoms were defined as pain, itching, muscle cramps, throbbing, and swelling. Ulcers, pigmentations, and ecchymosis were recorded as signs of varicose vein. Ecchymosis was defined as haemorrhagic lesions larger than > 3 mm on the skin of lower extremities, forming a flat, rounded or irregular, blue or purplish patch.

Results: Leg pain was the most common symptom in our study population. Ecchymosis was observed in 34 patients (6%). Logistic regression analysis showed that ecchymosis was significantly and positively associated with muscle cramps (odds ratio: 5.82, $p = 0.001$) and female gender (odds ratio: 5.17, $p = 0.019$) but negatively associated with age (odds ratio: 0.94, $p = 0.004$).

Conclusions: We have documented for the first time the frequency of ecchymosis and its association with muscle cramps in a relatively large patient population with peripheral varicose vein or chronic venous insufficiency. Ecchymosis on lower limbs should be considered as a novel sign of varicose vein.

e-poster number 87

SCLEROTHERAPY OF PRIMARY AND SECONDARY TELANGIECTASIAS: A PROSPECTIVE, RANDOMISED, COMPARATIVE CLINICAL TRIAL OF 75% GLUCOSE VS. SODIUM TETRADECYL SULPHATE

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Objectives: To compare the efficacy and safety of 75% glucose with 0.2% sodium tetradecyl sulphate (STS).

Material and methods: A prospective, randomised clinical trial compared the results between areas treated with 75% glucose and areas treated with 0.2% sodium tetradecyl sulphate. The inclusion criteria were primary or secondary telangiectasias not related to the reticular veins. Photographs were taken before and after the treatment with a high-definition digital camera. Median volume of 0.3 mL per puncture was injected with a 30 G needle. Injections were done until complete whitening of the telangiectasias. After the procedure, elastic compression stockings were applied for 24 hours. Then the patients wore the stockings during the day only for five days. The primary efficacy end point was the disappearance of the telangiectasias within 14 days after treatment. The clearing of the vessels was assessed by two independent experts using the six-point scale: from 0 (no change) to 5 (100% cleared). Safety outcomes were analysed immediately after the treatment and after 14 days, and they included side-effects: visual disturbances, headache and migraine, anaphylaxis, skin necrosis, pigmentation, telangiectatic matting, and bruising.

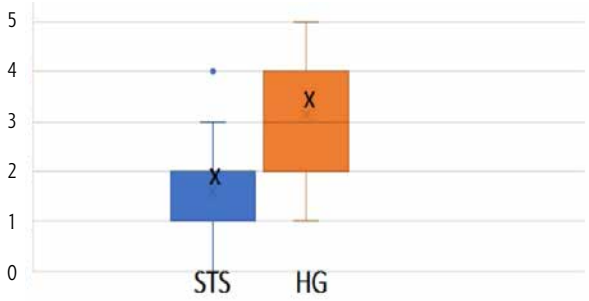

Fig. 1. The median score the clearing of the vessels in groups

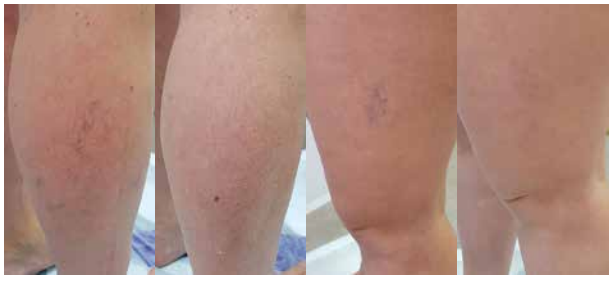

Fig. 2. The score 5 within 14 days after the treatment with 75% glucose

Fig. 3. Rate of good (4-5 point) and poor (0-2 point) results in the groups

Results: In total, 82 women undergoing sclerotherapy were randomized to receive either 0.2% sodium tetradecyl sulphate – 39 patients (STS-group) or 75% glucose – 43 patients (HG-group). The median score (interquartile range) was significantly lower in patients group STS than in group HG: 2 (1–3) versus 4 (3–4), $p < 0.001$ after 14 days (Fig. 1). The results were assessed as good and excellent (with 80-100% clearing) in 22 patients HG-group (51%), and only in 4 patients STS-group (10.3%), $p < 0.001$ (Fig. 2). In 29 patients STS-group (74%) and 11 patients HG-group (26%) the results were assessed as poor, $p < 0.001$ (Fig. 3). Pigmentation and intravascular clots following sclerotherapy were frequently observed in the STS-group (15% and 36% of patients in STS-group and 2% and 2% of patients in HG-group, $p < 0.001$). Matting developed in 2 patients (5%) after the sclerotherapy with STS. One patient (2.6%) was observed with a headache after the STS treatment with STS (Table 1).

Table 1. Sclerotherapy-related minor adverse events

	STS-group, *n* (%)	HG-group, *n* (%)	*P**
Intravascular clots	14 (36)	1 (2)	< 0.001
Pigmentation	6 (15)	1 (2)	0.035
Matting	2 (5)	–	0.133
Migraine	1	–	0.291

*χ^2 test

Conclusions: Sclerotherapy of primary and secondary telangiectases with 75% glucose was significantly superior to sclerotherapy with 0.2% sodium tetradecyl sulphate in this study population within 14 days after the treatment. Pigmentation.

e-poster number 88

AUGMENTED REALITY-ASSISTED FOAM SCLEROTHERAPY: ONE-YEAR FOLLOW-UP RESULTS

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Objectives: The aim of the study was an assessment of the safety and efficacy of a new tool in sclerotherapy, which give us a new vision of small veins invisible to the normal eye in one year of follow-up at our clinic as well at the National University Hospital of Asuncion Paraguay.

Material and methods: One hundred and fifty-two patients with spider veins underwent augmented virtual reality treatment with a Vein Viewer Flex Christie R. The efficacy criterion was the elimination of the vein as well as decrease of complaints: one week, and one, three, six, and 12 months after the treatment. Complications of sclerotherapy were reported during follow-up.

Results: Decrease or withdrawal of complaints of chronic venous insufficiency was reported in 96% of cases (50 patients). Disappearance or decrease of varicose veins was noted in all patients (100%). During examination after 12 months, full success of treatment was achieved in 95% of cases. No serious complications, such as deep vein thrombosis, pulmonary embolism, dyspnoea, or allergic reactions, were observed.

Conclusions: Vein viewer augmented reality foam sclerotherapy of spider veins as well as smaller varicosities with polidocanol was found to be an effective and safe method of treatment during one year of observation.

e-poster number 89

SAFETY AND EFFICACY OF LOW-CONCENTRATION, HIGH-VOLUME FOAM SCLEROTHERAPY FOR THE TREATMENT OF VARICOSE VEINS AND ASSOCIATED ULCERS

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Objectives: Varicose veins (VVs) are associated with lifestyle-limiting symptoms and complications. This study evaluates the safety and

efficacy of endovenous foam sclerotherapy (EFS) for the treatment of VVs.

Material and methods: Forty-four patients with VVs having chief complaints of leg pain, pruritus, swelling, ulcerations, thrombophlebitis, or varix rupture were included. The Venous Clinical Severity Score (VCSS) was calculated. EFS was performed with 0.2% polidocanol mixed with air in the ratio of 1 : 1. The maximum amount of foam injected was up to 140 ml per leg. The VCSS was reassessed three months post procedure. Resolution of the chief complaint at three months was the primary efficacy measure, and a statistically significant reduction in the VCSS was the secondary efficacy measure. The patients were followed up for one year to observe for recurrence of the chief complaint.

Results: The primary and secondary efficacy measures were achieved in 95% of the patients. 90% of the 20 patients with ulcers had complete healing at three months post procedure. Recurrence of the chief complaint was seen in 9% (4) patients at the end of one year of follow-up.

Conclusions: Low-concentration, high-volume foam sclerotherapy is efficacious and safe in the management of varicose veins. The low cost of therapy is the biggest advantage of this technique.

e-poster number 90

FOAM SCLEROTHERAPY IN THE TREATMENT OF PUDENDAL VARICOSE VEINS

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Objectives: The aim of the study was to improve immediate and short-term results of treatment of patients with varicose disease complicated by pudendal varicose veins, by using perivenous ultrasound-guided tumescence infiltration (UGTI) in addition to short catheter-directed foam sclerotherapy (SCFS) of incompetent genital side branches and perforators. The positive role of tumescence in foam sclerotherapy is to decrease vein size, blood content, and inflow in the target vein. At the 2012 EVF meeting a prospective comparative study was presented, which demonstrated better outcomes when UGTI was added to LCFS of the GSV4 (82.4% occlusion rate after 14 months vs. 71% in patients treated without UGTI).

Material and methods: Our retrospective study (2018-2019) included 18 patients with varicose disease (C2) complicated by pudendal varicose. The age of the patients was 27 to 42 years. SCFS was performed using a vein catheter and Aethoxysklerol 1-3% with ultrasound control and tumescence anaesthesia. SCFS alone or in combination with miniphlebectomy and/or sclerotherapy of side branches and perforators was performed. Treatment of perforators was performed either immediately or at the second session (two weeks – three months after first procedure). The effectiveness of treatment was assessed every two months within a year of the intervention.

Results: In the 18 patients, the technical success rate was 78% (no recanalisation). At the same time, all patients had a high activity of reparative processes in the varicose zone in the first weeks after the procedure. There were no infectious-inflammatory complications. No major complications occurred, although bruising (5.5%), thrombophlebitis of the side-branches (5.5%), and non-permanent paraesthesia (5.5%) were observed. Sclerotherapy of side branches and perforators in the second session was performed for 15 patients (83.3%).

Conclusions: The implementation of CDFS for the treatment of patients with complicated forms of varicose veins allows improvement of the results of treatment, avoiding infectious and inflammatory complications. The proposed method of treatment does not require long hospitalisation of patients and can be a method of choice in outpatient practice. Minimising surgical intervention leads to earlier recovery of work capacity and the patient's return to active life.

e-poster number 91

ULTRASOUND-GUIDED FOAM SCLEROTHERAPY OF SAPHENOUS VEIN, PLUS MINI-PHLEBECTOMY OF EPIFASCIAL VARICOSE VEINS

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Objectives: After performing epifascial varicose vein removal through miniphlebectomy, and leaving aside the insufficient saphenous vein treatment for a second procedure, it has been noted that in most cases the latter has decreased its calibre, and in others the blood flow has stabilised. Besides the aesthetic effect, a significant decrease in symptoms has also been noticed, which resulted in a high rate of patient satisfaction. By giving careful consideration to this information, and to similar observations from journals, a treatment protocol has been developed to perform ultrasound-guided foam sclerotherapy for saphenous vein incompetence in combination with miniphlebectomy of epifascial varicose veins.

Material and methods: A total of 557 cases were studied; while 495 presented great saphenous vein incompetence, only 62 cases displayed small saphenous vein incompetence. 358 were female and 199 were male patients, who received treatment between March 2011 and March 2018. Inclusion criteria involved recruiting patients who had not been treated before, and who presented saphenous vein incompetence CEAP C2 to C4. Their ages ranged from 22 to 77 years. An ultrasound-guided sclerotherapy was performed by applying 3% polidocanol with foam made by the Tessari method in a ratio of 5 : 1. Afterwards, the varicose trails were infiltrated with lidocaine 1%, and the miniphlebectomy was performed according to Dr. Muller's method. Elastic compression stockings and ambulation were the subsequent immediate steps. Patients received medical supervision 24 hours later, then a week later and a month later. After that, they were followed-up every six months, i.e. twice a year, and were followed for at least seven years if diagnosed with great saphenous vein incompetence.

Results: A 96% occlusion was achieved in the first year, 87% towards the third year, and a 70% towards the seventh year in cases that were treated during the first year. It is important to point out that cases presenting small saphenous incompetence had the highest positive response. While the most frequent complications included haematomas or hyperpigmentation, the least frequent were pain and paraesthesia.

Conclusions: Two well-known procedures have been combined to obtain the desired effects. By removing the tributaries from the saphenous vein, its calibre decreases. Thus, sclerotherapy gives better outcomes. It is a safe procedure that may cause minor complications; it is also inexpensive and aesthetic, with a high success rate and rapid return to work.

e-poster number 92

SCLEROTHERAPY OF GREATER VEINS AND SAPHENOUS VEINS (GREAT AND SMALL): TO BE PERFORMED OR NOT?

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Objectives: Sclerotherapy has become one of the most common treatments of varicose vein. However, much research has been made about it but not so much about sclerotherapy of saphenous veins. We tried to compare our experience with that of others. Our aim was to find the best way to treat saphenous veins (great and small) with sclerotherapy and the best type of sclerosants. Also, we followed up the treated patients and examined the percentage of recurrence.

Material and methods: We treated 21 patients with sodium tetradecyl sulphate STS in the range of 1-3%. Nine of them had big incompetence of the great saphenous vein GSV, two had incompetence of the small saphenous vein SSV (over 1 sec), and 12 of them had varicose veins larger bigger than 1 cm. We followed up patients after one and six months. Treatment was done in lying and standing positions.

Results: We followed up 19 (90%) of all patients. More than 85% of all treatments were successful. We noticed recurrence in two cases. Our results were similar to other research and published papers. No complications were noticed.

Conclusions: Sclerotherapy is good choice for treatment of the GSV and SSV incompetence. Treatment of the GSV should be done with very good planning and management. Post-treatment care and patient behaviour is important for the final result.

e-poster number 93

FACIAL VEIN FOAM SCLEROTHERAPY

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Objectives: To assess the feasibility of foam micro sclerotherapy in facial and nasal telangiectasias. Few articles present the efficiency of sclerotherapy, and none has mentioned the efficiency of foam micro sclerotherapy for facial treatments.

Material and methods: Between 2017 and 2019 we selected 10 healthy patients, median age 53 years (male to female ratio 6 : 4). The presence telangiectasias in the face did not relate to a systematic disease. Complete anamnesis was taken, and we excluded in our criteria patients with history of migraine. In all the cases we used polidocanol 0.5% (Kraussler Phram) and foam technique 4 : 1 in 2.5 cc sterile Terumo syringes according to the Tessari method. With the patients sitting on a dermatologic table, we injected the sclerosing agent with a 30G-32G intradermal needle directly into the nasal veins under a good visualisation technique. The average dose was 1.5 cc, and the procedure took 2 min max. Immediately after the injection, we applied local compression for 20 minutes, and we observed the patient for another 20 min.

Results: In all the patients, satisfactory results were obtained. In our group one patient had a small haematoma, which disappeared. On average we needed 2.5 therapeutic session for each patient. Patients were instructed to avoid exposure of the treatment area for two weeks and use sun protection cream with factor 50.

Conclusions: Implementation of foam micro-sclerotherapy in the treatment of visual telangiectasia is feasible, and in our group no complications were observed. Further studies are needed, including a comparison study between laser and microfoam sclerotherapy in facial veins.

e-poster number 94

FOAM SCLEROTHERAPY IN THE TREATMENT OF RECURRENT VARICOSE VEINS

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Varicosities of lower limbs is one of the most common medical conditions, and a lot of treatment modalities are available. However, none of them is superior to the other in the initial therapy. Invasive treatment of superficial varicose veins and venous reflux improves quality of life compared with conservative treatment with compression stockings. We show the effectiveness of foam sclerotherapy in the treatment of recurrent varicose veins based on the diameter of the veins. We describe three cases treated with foam sclerotherapy, with excellent clinical and functional results. Foam sclerotherapy is effective, safe, inexpensive, and with a high level of acceptance to treat recurrent varicose veins.

e-poster number 95

VISCOUS BIOMATRIX SCLEROFOAM – A NEW TOOL FOR LARGE RECURRENT VARICES

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Objectives: Common sclerofoams are inferior to thermo-occlusion regarding primary and long-term results. A novel microfoam using a biomatrix based on denatured autologous blood proteins is currently in evaluation for various targets. By view from physics, its properties of increased density and viscosity while maintaining fast solubility when entering streaming blood should allow better replacement of blood and therefore more precise and more effective foam sclerotherapy.

Material and methods: In a prospective pilot study, 85 patients (56 f, 29 m, 31-78 y) with large and tortuous recurrent varices (5-15 mm Ø, mean 8.2; 291 targets) after previous vein surgery (1-12 y ago, mean 6.8 y), originating from the junctions SFJ and SPJ, were selected in bail-out situations to receive biomatrix sclerofoam (BSF, prototype, Venartis, laboratory-prepared) instead of standards. BSF consisting of 40% Aethoxysklerol 2%, 20% biomatrix, and 40% filtrated air was deployed via catheter (Phlebo-Cath, 2.0-2.3 mm Ø, or Microcaths 1.6 mm Ø). Follow-up including ultrasound was performed after two weeks, two months, and one year.

Results: Primary total occlusion of all segments intended to treat was obtained in 280/291 cases (96.9%). 11/291 targets (3.8%) required a second foam application (GSV: $n = 3$, SSV: $n = 2$, tributaries: $n = 2$, perforators: $n = 3$, superficial recurrences: $n = 1$). There were no complications, in particular no DVT. After one year, partial and focal reperfusion was observed a in few cases: SFJ: 3/65 (4.3%), GSV: 4/65 (6.2%), SPJ: 2/20 (10.0%), SSV: 2/31 (6.4%), tributaries: 6/64 (9.4%), perforators: 4/43 (9.3%), superficial varicosities: 4/61 (6.5%). None of the cases had foam-related symptoms.

Conclusions: Viscous biomatrix sclerofoam, as a new experimental modality, seems to be safe and effective for use in large recurrent varices. One-year data are clearly superior to the results of Tessari-type sclerofoams. Comparison with standard foams will follow after the manufacturer's final definition of a particular product.

e-poster number 96

LIGATION OF GSV IN SCLEROTHERAPY WITH FOAM. TECHNICAL NOTES. PERSONAL EXPERIENCE

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Objectives: The specific complications after treatment of incompetent GSV with foam are early recanalisation (13%) and superficial thrombophlebitis (7.4%).

Material and methods: From 1 January 2016 to 31 December 2018, out of a total of 524 patients (CEAP C2-C3), 105 sclerofoam treatments of GSV were performed for varicose veins of the lower limbs. The indications to treatment, according to guidelines, were: sapheno-femoral reflux > 3 sec, saphenous diameter 8-13 mm, and at least two varicose thigh/leg collaterals. To obtain the GSV, local surgical anaesthesia was performed with a surgical access localised to the thigh, always above the end of the Hunter perforator and of the varicose collateral. The GSV was bound and sectioned and finally cannulated with an Arteriofix 8 mm catheter, through which, after washing with physiological solution, the sclerofoam was introduced with TDS 3% or Polidocanol 3% (ratio 1 : 4) for a maximum of 4 cc of foam according to Tessari's technique. The remaining saphenous vein and collateral veins were removed with the Muller technique. Controls with ecocolour Doppler are expected at one, three, and six months and two years.

Results: In four patients (3.8%), although very thin, a superficial phlebitis of the thigh was found in the first month, between the surgical incision and the inguinal fold. In two cases there was a small superficial collateral with high concentration phlebitis of the sclerosing drug. Recanalisation occurred after two years in only 10 patients (9.5%). In all cases the diameter of saphenous veins was reduced by more than 50%, the saphenous walls were thickened, there was no reflux at the saphenofemoral junction, and clinically the patients reported no disturbances. In all other patients, GSV presented with obliterated and reduced calibre or were fibrotic.

Conclusions: From these first results, we can state that this technique, which includes the ligation of the GSV, makes the foam more stable than that which occurs with direct injection of the GSV. The sclerosing drug between the barrier flow of the superficial epigastric vein and the ligature keeps the foam state for longer, and therefore the damaging action on the endothelium is stronger. Furthermore, a smaller amount of foam is sufficient, with no local and general phenomena and complications.

e-poster number 97

A STATISTICAL STUDY ON PATIENT SATISFACTION AFTER UNDERGOING SCLEROTHERAPY TREATMENT

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Although sclerotherapy is often an effective and safe treatment, we rarely observe patients who are dissatisfied with the treatment. In this paper, in order to evaluate the satisfaction of patients who have undergone the sclerotherapy procedure, two questionnaires, before and after the procedure, were designed. The first questionnaire, before the procedure, was developed to assess patients' expectations of the procedure, procedure complications, and results. A month later they were asked to fill in a second questionnaire. In this stage they described how the procedure actually was and how much it corresponded with their expectations based on the given information. We analysed the data to understand the reasons for the cases in which the expectations of the patients were not satisfied. Preliminary results showed that, in most cases, offering an accurate explanation of the treatment procedure helps the patients meet their expectations.

e-poster number 98

THE CLACS CERTIFICATION: DIFFICULTIES OF IMPLEMENTATION IN RUSSIA

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CLaCS is a new technique developed by R K Miyake, Brazil to treat C1. It quickly became popular in many countries the world over. There are certain difficulties in implementing the original technique in the Russian Federation. This paper describes an original method of CLaCS and shows the results of one private institution in Russia comparing CLaCS, phlebectomies, and sclerotherapies over a period of 11 months. There are difficulties in implementing CLaCS in Russia, such as the language barrier, the cost of training, the distance from the training centre, and the absence of national guidelines as well as some other minor reasons for delaying the establishment of CLaCS centres in the country.

e-poster number 99

EXPERIENCE WITH THE USE OF PERILESIONAL AND INTRALESIONAL RECOMBINANT HUMAN EPIDERMAL GROWTH FACTOR (NEPIDERMIN) IN THE TREATMENT OF PATIENTS WITH CHRONIC VENOUS ULCERS

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Objectives: The aim of the study was to describe results in the healing of venous ulcers with the perilesional and intralesional use of the recombinant human epidermal growth factor (nepidermin) in patients with CEAP class 6.

Material and methods: A retrospective review of a multicentric case series study of 28 patients with diagnosis of chronic leg venous ulcer, treated at the Centro de Cirugía Ambulatoria and at Centro Médico Nuestra IPS in the city of Bogotá between November 2016 and December 2017, who received recombinant human epidermal growth factor (nepidermin) through perilesional and intralesional injection. The patients were studied, taking into account age, sex, ulcer size, and wound healing response assessment.

Results: In the studied series, the patients were on average 60 years of age, mostly women (61%), many of them with an ulcer located in the medial malleolus (47%). Based on the severity of the wound, it was found that upon treatment initiation that 26% (9) were classified as severe, 71% (25) as moderate, and 3% (1) as minor. According to the post-treatment severity score, 80% of the lesions, represented in 28 wounds, dropped to a minor level, 14% (five lesions) to moderate, and 6% (two lesions) remained as severe. 100% rate of epithelialisation of the lesions was achieved in 69%, and global improvement of the patients observed was 86%. The average duration of the treatment was 5.6 weeks with an interval of 4 to 8 weeks. The average number of nepidermin 75-µg vials used was 15.7 per patient.

Conclusions: The results obtained show that the use of the recombinant human epidermal growth factor (nepidermin) achieved a high improvement rate in the reduction of the severity index of the lesions allowing epithelialisation and wound healing in most cases and in a short time.

e-poster number 100

ASSESSING THE ROLE OF CONCOMITANT USE OF THE GEKO™ DEVICE AND COMPRESSION IN THE TREATMENT OF VENOUS LEG ULCERS

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Objectives: The Geko™ device, powered by OnPulse™ neuromuscular electrical stimulation technology, has been recommended for use in the prevention of DVT and treatment of leg ulcers. Compression remains the standard treatment of venous leg ulcer. In this study, we examined the haemodynamic effect of concomitant use of the geko device with compression in the treatment of venous leg ulcer.

Material and methods: This prospective study was approved by the Ethic Committee. Sixteen patients with venous leg ulcers were recruited from the wound clinic. Venous and arterial flow parameters were measured using imaging Doppler ultrasound. Measurements were made of peak arterial and venous velocity (PAV, PVV), arterial and venous volume flow (VAF, VVF), and vessel diameter (D) of the popliteal artery and vein in sitting and recumbent positions. Measurements were taken at baseline (following a 10-minute stabilisation period), with the geko fitted for 10 minutes and with the geko and compression fitted for 10 minutes.

Results: Arterial parameters: In the seated position, use of Geko device significantly increased PAV ($p < 0.001$) and VAF ($p < 0.001$). Application of compression did not significantly improve flow over Geko alone, but the improvement was maintained compared to baseline. In the recumbent position, Geko showed a significant ($p < 0.006$) increase in PAV. Added compression resulted in a higher mean value for arterial flow but was considered insignificant due to artefacts. The VAF exhibited substantial noise in all treatment modalities, possibly because of a reduced hydrostatic pressure renders the measurement proportionally more sensitive to variations due to breathing and other biological noise. Geko alone showed a significant ($p < 0.04$) increase in VAF. Adding compression, significantly ($p < 0.05$) reduced volume flow compared to Geko alone, perhaps because the compression provided additional resistance to outflow. This effect was not seen in the seated position, and it is possible that the additional hydrostatic head associated with the seated position was enough to overcome this resistance. Venous parameters: PVV with Geko showed a highly significant ($p < 0.001$) increase over baseline, with or without compression, both in seated and recumbent positions. In the recumbent position Geko alone showed significantly ($p < 0.01$) higher PVV than Geko + compression. This may be due to lower hydrostatic pressure in the recumbent position that renders the vein more vulnerable to occlusion by compression. In both the seated and recumbent position, the mean value for VVF was higher with Geko, but the high level of noise renders this difference statistically insignificant.

Conclusions: The results of our study have important implications in the management of patients with venous leg ulcers.

e-poster number 101

DEVELOPMENT OF STEM CELL SPHEROID LOADED PATCH FOR TREATMENT OF CHRONIC VENOUS ULCER

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Stem cell therapy has been suggested as a promising treatment for many chronic diseases. Chronic venous ulcer is usually hard to cure and has become an object of interest for stem cell therapy. Commonly used methods to deliver stem cell to skin wounds were injection of stem cells to the wound border zone or spraying cells onto the wound surface. But these methods had several obstacles such as low survival rate of delivered stem cells and low therapeutic effect. To overcome these problems, we designed a skin patch that can be attached to the wound surface and deliver stem cells as spheroid shaped stem cells. We developed a patch that contained 1.5×10^6 number of human adipose-derived stem cells (hADSCs) spheroid size 300 μm diameter. hADSC spheroid in the patch showed higher angiogenic protein secretion compared to two-dimensional cultured cells. In a mouse skin wound healing model, stem cell spheroid loaded patches promoted rapid wound healing and skin regeneration. This study shows the novel approach of stem cell delivery for treatment of chronic skin wounds.

This research was supported by a grant of the Korea Health Technology R&D Project through the Korea Health Industry Development Institute (KHIDI), funded by the Ministry of Health & Welfare, Republic of Korea (HI17C1728), and by the Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (2016R1A6A3A11932211).

e-poster number 102

THE IMPORTANCE OF PATIENT EDUCATION IN THE TREATMENT OF VENOUS ULCER

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Objectives: Venous insufficiency may lead to venous ulcer, which is a chronic disease that requires recurrent treatment. Patients tend to engage the support of healthcare providers who treat the wound. After healing, the patient is responsible for self-care. In this case report we present our experience with a patient with recurrent venous ulcer, who received treatment education prior to healing.

Case report: A 40-year-old male with no medical history referred to our clinic with right leg swelling and C6 venous ulcer. He was treated by many other clinics for two years, but the wound reappeared immediately after discharge. The patient was discouraged and reluctant to undergo treatment. A wound culture specimen revealed Pseudomonas and *Escherichia coli* growth on the wound. Antibiotics were given, and a silver wound dressing with compression therapy was applied. In addition, throughout all the steps, the patient was encouraged to take an active role during the procedures and was educated prior to healing. The patient was also referred to psychotherapy to accept the situation and normalise the disease. After four months his ulcer was epithelised, and after six months of follow-up he was satisfied with a class 2 compression stocking. The patient was happy and motivated to change his lifestyle and adapt to his situation.

Conclusions: Varicose veins in the lower limbs are common, and 3% may develop venous ulcer (Riggs & Closs 2003). Chronic wounds are unsightly, cause pain and suffering, and are expensive to treat (Kapp & Sayers 2008). Believing that wearing compression stockings is important for recurrence prevention is a common finding in both qualitative and quantitative research studies (Jull *et al.* 2004, Kapp *et al.* 2010). By taking an active role with one's disease and taking psychotherapy, patients can understand the reasons for treatment, and this belief increases the efficiency of the therapy.

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e-poster number 103

DOUBLE FOCAL COMPRESSION BANDAGING. EIGHTEEN YEARS OF FOLLOW-UP. AN EFFECTIVE AND EFFICIENT THERAPY FOR HEALING VASCULAR ULCERS IN LOWER LIMBS

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Objectives: Vascular leg ulcers have a high socioeconomic cost in world health systems. We use the effect of local pressure on the wound bed. This is a clinical experience in the healing of vascular ulcers in lower limbs (for almost 18 years) in more than 150 patients, with very good results. To achieve this, it is necessary to improve tissue perfusion in the wound bed, by applying external pressure using a compression technique: "Double focal compression bandaging".

Material and methods: The first bandage is used for the focal compression of the wound bed, and another bandage covers the first, to achieve a gradual external compression from the toes to the knee, each turn of the band covers the preceding turn by 50-70%. The area of the ulcer receives the pressure of three layers (that of the pressure over the wound bed, and the double effect of the external gradual compression). It is necessary: A) to make a differential diagnosis; B) to establish a clinical diagnosis; and C) to measure the ankle-brachial index to exclude severe arterial disease. Diagnostic tools include: A) a handheld Doppler ultrasound device; B) a 5.07 monofilament and 128-Hz tuning fork; C) scales; D) the Edinburgh claudication questionnaire; and E) a camera.

Results: A representative showing of clinical cases, healed by means of this technique: 1. Early treatment is essential for healing venous leg ulcers. 2. Only mechanical debridement is necessary. The focal compression alone is enough to provoke its autolytic debridement. 3. We have observed contamination of wound bed, but not infection. Only oral antibiotics were used if there were signs of infection, such as fever and cellulitis. Local pressure on the wound bed avoids using any kind of antimicrobial agents. 4. Compression is strongly contraindicated in the event of severe peripheral arterial disease, but in expert hands and according to signs and symptoms, and with daily follow-up, it is possible and convenient to apply compression therapy. 5. We must be patient; the ulcer may take months, even years, to fully heal. 6. New ulcers may appear even in other parts of the same leg being treated. 7. No recurrences have been observed in the treated area. 8. Several patients with cardiac failure (excluding grade IV) were treated by compression therapy.

Conclusions: 1. It is an effective and efficient technique because we can heal the ulcers with optimal resources. 2. The cooperation of the people who live with the patient is necessary.

e-poster number 104

SHAVE-THERAPY WITH SIMULTANEOUS AUTODERMOPLASTY FOR PATIENTS WITH EXTENSIVE TROPHIC ULCERS

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Objectives: Due to the recent increase in the rate of patients with large trophic ulcers or conservative therapy ineffectiveness, it has become necessary to apply invasive methods for trophic ulcers. One such method is a layered tangential suprafascial necrosectomy and fibrosectomy, also known as shave-therapy, in combination with autodermoplasty.

Material and methods: During the last 12 months 17 patients with venous trophic ulcers were operated; 10 of them had ulcers against the background of the varicose veins, and seven suffered from post-thrombotic disease; five males and 12 females. Average age 62.7 ±5.9 years. Average trophic ulcer size 204.4 ±12.9 cm^2. Average trophic ulcer existence dura-

tion 4.67 ±4.8 years. All patients were operated using the method of layered tangential suprafascial necrosectomy and fibrosectomy, also known as Shave-therapy, in combination with autodermoplasty. A 0.3 mm skin flap was removed from the thigh of the affected limb using electrodermatome. Shave-therapy was applied for all patients, regardless of the wound process stage, until the bleeding surface appearance. Each removed layer thickness was 0.2-0.4 mm. A surgical stapler was used to staple skin flaps. In order to avoid under-flap haematoma formation several skin flap perforations were done with a scalpel. For compression of the lower extremities an inextensible bandage was used. Surgical procedures were performed in a round-the-clock hospital. In 13 cases patients were under endotracheal anaesthesia, and in four cases under spinal anaesthesia. In 10 cases, in addition to other manipulations, EVLA (endovenous laser ablation) was simultaneously performed in order to eliminate venous reflux.

Results: When evaluating the results, the skin flap adaptation on the wound was examined in the first 12 days, then at 20 and 30 days. On the 12th day in all patients no skin flap lysis was observed. On the 20th day marginal lysis of the flap was detected in two cases. On the 30th day all patients had almost full healing of wounds.

Conclusions: Layered tangential suprafascial necrosectomy and fibrosectomy, also known as shave-therapy, in combination with autodermoplasty is an effective, modern, extensive treatment method for patients with venous ulcers; it allows the closure of extensive wound defects without preliminary preparation.

e-poster number 105

NON-HEALING VENOUS ULCERS – KERATINOCYTES, DERMIS, GRANULATION TISSUE – WHICH ARE DEFECTIVE?

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Objectives: An open question is: Which skin layers should be naturally reconstructed first in venous ulcers in order to cover the surface by epidermis? The aim was to study the healing process in epidermis, dermis, and granulation tissue of venous ulcers.

Material and methods: Tissue specimens of ulcer edge with epidermis, dermis, and granulation tissue from the mid portion of ulcers, epidermal islands spontaneously growing on granulation tissue, and tissue from the site of the ulcer edge biopsy were obtained from 20 patients.

Results: Ulcer edge. KC expressed HLA DR and proliferating cell nuclear antigen, p63 (stem cell), CD29 (transient cell), and keratin 10, 16, and 17. There were no Langerhans cells between borderline KCs. Dermis. The dermis at the ulcer edge showed normal structure with few infiltrates. Macrophages (mf) and a few granulocytes (PMN), no lymphocytes (L), only a few fibroblasts, and collagen fibres were seen. Granulation tissue. Granulation tissue was in the bottom layers deprived of lymphocytes and fibroblasts and showed few vessels. The upper layer contained mostly PMNs; the lower layer contained a few mfs, fibroblasts, and blood capillaries. Epidermal islands. Six to 10 KC layers, densely infiltrating mfs, no PMNs, and multiple blood capillaries were seen. Edge biopsy site. Seven days after biopsy of the ulcer edge the KC proliferated vigorously and migrated upon the granulation tissue. There were dense mf and PMN infiltrates. Skin defects after biopsy healed within 10 days.

Conclusions: Lack of formation of dermal structure in the granulation tissue seems to be the factor responsible for the lack of covering of the ulcer by KC.

e-poster number 106

IN VITRO BLOOD IMMUNE CELL ADHERENCE TEST TO WOUND TISSUE REVEALS SUBSETS PARTICIPATING IN HEALING

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Objectives: Circulating polymorphonuclear leucocytes are recruited in the wound by soluble mediators, causing cell adherence, transcapillary migration, and chemotaxis. In a later stage, T cells play a modulatory role in wound healing, although the full range of their effects is incompletely understood. There is no evidence that B lymphocytes play a significant role in wound healing. The question arises: Which immune cells and their specific subsets accumulate in fast and delayed healing of wounds, and when? This applies particularly to lower limb non-healing ulcers.

Material and methods: In order to define which blood immune cells reveal predilection for wound cells or matrix, an in vitro adherence test was devised. Briefly, cryopreserved tissue sections were covered with blood leukocyte suspension at 4°C, incubated for 30 min, and the non-adherent cells were washed out. This test revealed: a) adhesion to fibroblasts, keratinocytes, endothelial cells, and matrix; and b) phenotypes of adhering cells stained with monoclonal antibodies. Venous ulcer edge biopsy specimens obtained from 15 patients and skin fragments of five healthy patients undergoing varicose vein surgery were studied.

Results: Ulcers-neutrophils adhered to granulation tissue around capillaries and to the matrix, forming clusters. Few adhered to fibroblasts. They also stuck to the epidermis. CD68-positive and elastase-positive monocytes were evenly distributed close to the capillary lumen. A few scattered, irregularly distributed CD3 T cells were seen on granulation tissue but none on the epidermis. On normal skin section adherence of neutrophils, monocytes, and lymphocytes was almost nil. Interestingly, all cell types strongly adhered to glass.

Conclusions: The preponderance of neutrophils and monocytes over lymphocytes on granulation tissue sections suggests the presence of a signal for their accumulation as in the scavenging phase of wound healing. The signal might be microbes and autoimmune tissue-antigen-specific cohorts of granulocytes and lymphocytes.

e-poster number 107

ACUTE ON CHRONIC PAIN OF THE LOWER ABDOMEN AS A RARE MANIFESTATION OF OVARIAN VENOUS INSUFFICIENCY: A CASE REPORT

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Objectives: Ovarian venous insufficiency is permanent venous dilatation due to valvular incompetence or venous obstruction. This disorder is associated with chronic pelvic pain, typically in young multipara women. The acute onset of the symptoms related to ovarian venous insufficiency is a rare condition, but it is possible.

Case report: A 39-year-old gravida two, para two (G2P2) female was referred to our vascular surgery clinic by her gynaecologist with a chief complaint of pelvic (especially left sided) pain since three days ago plus mild haematoma near the left ovary and an increase in the flow of left ovarian vein, which were all reported in transabdominal ultra-sonography. The patient had no symptoms of vaginal leakage, dyspareunia, or menstrual disorder. In the physical examination, the abdomen was not distant; however, the patient had tenderness in the lower abdomen, especially at the LLQ and hypogastric region. Gynaecological examinations were normal, and there was no sign of abnormal varicose in the genitalia. The patient had a history of aortic valve replacement seven years previously and took Warfarin. In the paraclinical assessment, the beta HCG of the patient was negative and lab data other than INR were within the normal range. In contrast CT, the diameter of the left ovarian vein was more than 9 mm and a minor haematoma was evident in the pelvic area. Selective venography was done for further assessment. In venography, severe reflux of the left ovarian vein was visible even without Valsalva manoeuvre. The patient was taken to the hybrid suit for coil embolisation of the left ovarian vein. Access was achieved from the jugular vein by a 6Fr sheath, and after cannulation of the left renal vein and ovarian vein, coil embolisation from the distal ovarian vein to the last collateral were performed. The patient was completely satisfied in follow-up; the severe pain and her chronic pelvic pains were diminished.

Conclusions: Ovarian venous insufficiency is a common disorder in multiparous women. It is better to consider acute abdominal pain as a rare manifestation of this disorder.

e-poster number 108

MODERN VIEW ON PELVIC CONGESTION SYNDROME DIAGNOSTICS AND TREATMENT

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Objectives: The main principle of treatment in patients with varicose veins (VV) of the lower limbs is the elimination of pathological venous reflux. In typical cases, reflux forms in saphenofemoral and/or saphenopopliteal junction. The aim of the study was to identify the possibility of using minimally invasive interventions in patients with VV of the lower limbs to eliminate pathological venous reflux formed above the level of the saphenofemoral junction.

Material and methods: Examination of the blood flow in the ovarian and internal iliac veins in 17 women with VV of the posteromedial surface of the thigh and gluteal region was carried out. Colour duplex scanning with Valsalva test was performed for reflux detection of the pelvic and subcutaneous veins. Phlebography and computed tomography were performed to exclude patients with May-Turner and nutcracker syndrome.

Results: Ultrasound signs of pelvic venous insufficiency were dilated veins of myometrium > 4 mm, ovarian veins > 8 mm, and reverse blood flow during the Valsalva test. Varicose veins of the perineum were noted in 13 (76.47%) patients, and in eight (47.05%) VV on the medial and posteromedial surface of the thigh were observed. The blood reflux on the left ovarian vein was recorded in 12 (70.58%) cases, and on the right – in four (23.52%). Analysis of the data led us to the idea of a "two-level" varicose disease, in which isolated correction of the pathological venous reflux distal to the inguinal ligament inevitably led to a recurrence of VV. Endovascular methods of correction of pathological venous reflux in ovarian veins were used in five patients (29.41%), in two of them (40.0%) laser ablation with 2ring radial fibre, and in three (60.0%) – radiofrequency ablation.

Conclusions: Elimination of the pathological venous reflux in ovarian veins may be suggested as a method of prevention of VV recurrence caused by pelvic venous insufficiency.

e-poster number 109

GETTING A COMPLETE HISTORY WILL HELP MOST IN THE DIAGNOSIS OF PCS: A CASE REPORT

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Objectives: PCS disease is a disabling disease in women, accounting for about 30% of patients with chronic pelvic pain, which may be missed if there is no clinical suspicion.

Case report: The patient was a 45-year-old multipara female with a complaint of lower-limb varicose veins from a few years ago, who had a history of pain in the groin and had a small varicose vein in examination in the proximal medial of the left thigh. At the examination, severe bilateral inguinal tenderness in lower abdominal areas was seen. With a more detailed history taking, we noticed the heaviness in the perineal region, dyspareunia, and dysmenorrhoea. In CT venography the pelvic congestion was confirmed, and in venography clear reflux of the internal iliac vein without signs of iliac and renal vein stenosis and gonadal vein reflux were seen. Coil embolisation of the internal iliac veins was performed in several steps, and the patient's problem completely disappeared and did not recur within one year.

Conclusions: In patients with chronic pelvic pain, a complete history of PCS symptoms is helpful for early diagnosis of the disease.

e-poster number 110

NANO-FABRIC SENSING TECHNOLOGY FOR INTERFACE PRESSURE MEASUREMENT

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Wearable devices have become a popular research topic, in which high-sensitivity, noise-proof sensing mechanisms with long-term wearability play a critical role in real-world implementation, while the existing mechanical sensing technologies (i.e. resistive, capacitive, or piezoelectric) have yet to offer a satisfactory solution to address them all. Here, we successfully introduced a flexible supercapacitive sensing modality to all-fabric materials for wearable pressure and force sensing using an elastic ionic–electronic interface (Fig. 1). Notably, an electrospun ionic fabric utilising nanofibrous structures offers an extraordinarily high pressure-to-capacitance sensitivity (114 nF kPa-1), which is at least 1000 times higher than any existing capacitive sensors and one order of magnitude higher than the previously reported ionic devices, with a pressure resolution of 2.4 Pa, achieving high levels of noise immunity and signal stability for wearable applications (Fig. 2). This is especially useful for venous and lymphatic care as traditional interface pressure sensing units have been independent of the pressure-generating device. Through the nanofibrous fabrication process, the fabric sensor can now be incorporated into an existing fibrous based compression therapy product line yielding extraordinary pressure sensitivity, and high signal-to-noise ratio and signal stability. More importantly, from the patient's perspective, a seamless, highly accurate, and on-the-spot interface pressure measuring technology is now available to digitise traditional fabric-based compression stockings, wraps, and bandages, to facilitate self-adjustment and care to provide the optimal pressure dosage to address chronic venous insufficiency and lymphoedema.

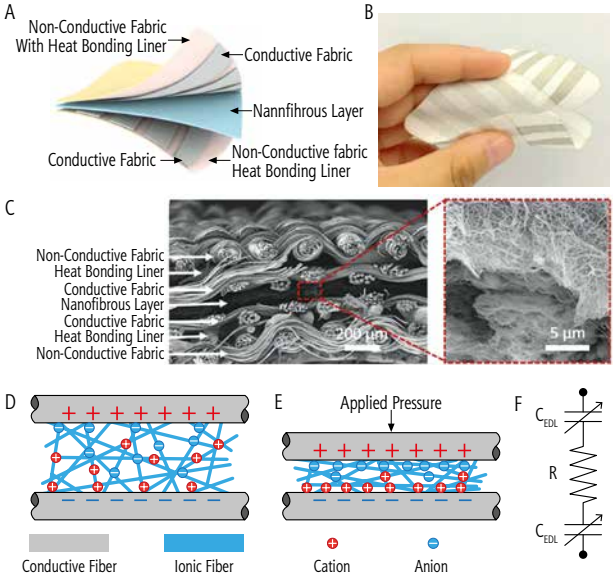

Fig. 1. Fabrication process

e-poster number 111

COMPLIANCE WITH COMPRESSION THERAPY IN CHINESE PATIENTS WITH VARICOSIS OF LOWER EXTREMITIES: RESULTS FROM SUMMER

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Objectives: Compressive stockings are an important and effective method in the management of patients with varicosis of lower extremities, but many patients do not fully comply with compression methods. This study aims to investigate the compliance of compression therapy

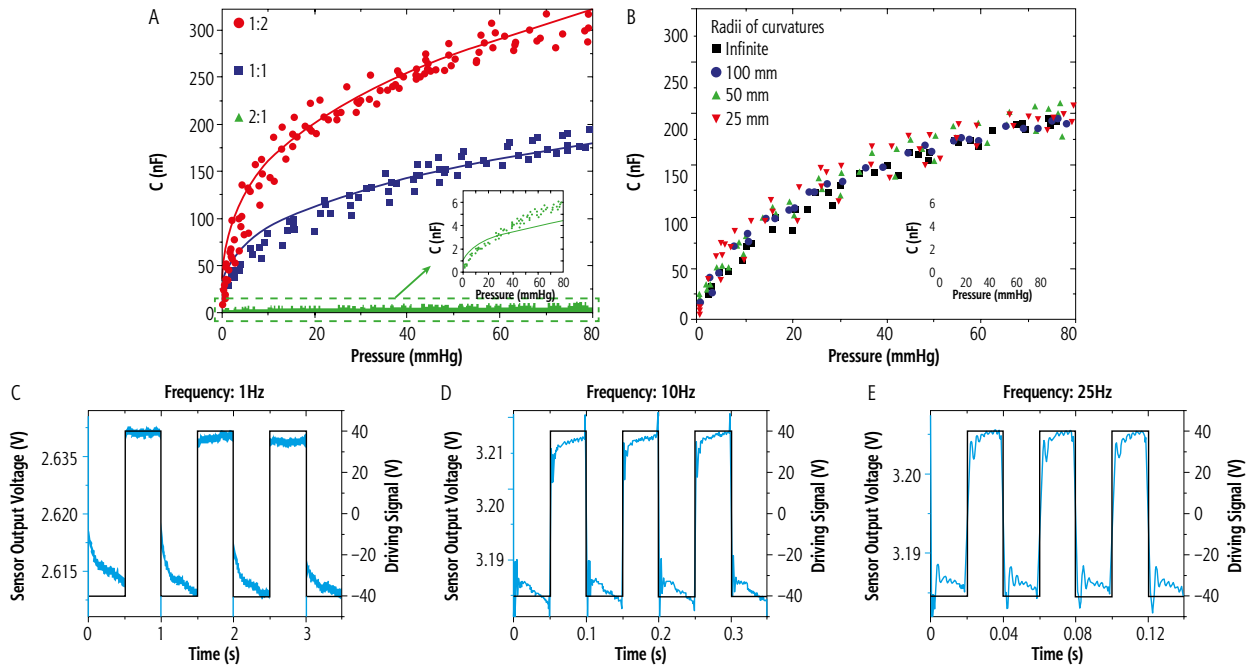

Fig. 2. Mechanical performance

among patients with varicosis of lower extremities and to describe common causes of non-compliance.

Material and methods: This study collected information on personal characteristics, type of socks, and reasons of non-compliance. A total of 131 patients with varicosis of lower extremities were contacted for participation; 126 answered the questions, which yielded 96% of the response rate.

Results: Only 36.2% of the patients reported wearing compression therapy as prescribed, 19.6% reported wearing compression on most days, 35.9% reported wearing compression intermittently, and 8.3% of the patients reported not wearing compression at all. The main reasons of non-compliance were: uncomfortable (29.4%), unnecessary (19.5%), too difficult to put on (16.5%), and sweating (16.3%).

Conclusions: Compliance with compression therapy among patients with varicosis of lower extremities is still a subject of concern because most patients are not using compression therapy as prescribed.

e-poster number 112

COMPLIANCE OF MEDICAL BELOW-KNEE COMPRESSION STOCKINGS: SIZING ISSUES IN AN INDIAN POPULATION

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Objectives: A few publications have pointed out the poor observance of wearing medical stockings. Several reasons are reported in different publications: inefficiency, compression stockings too rarely prescribed by a physician, not very well accepted during the early stages of chronic venous disorders, high cost, and poor tolerance. On the other hand, in Indian patients (North India), the morphology of the lower limbs is very different from that of European patients. This could be an explanation for the inefficacy and poor compliance of CS in the Indian population. The aim of the study was to measure the legs of 922 Indian patients originating from Punjab (North India) and to compare these measurements with the standards of Medi® Bayreuth, Sigvaris®, and Jobst® compression stockings (CS).

Material and methods: We measured the circumferences at different levels according to the recommendations of the manufacturers' sizing tables (Medi®, Sigvaris® and Jobst®) to determine the size of the below-knee CS: 1) Instep (level Y) only for Medi-Bayreuth® and Sigvaris®; 2) Ankle (level B) for Medi-Bayreuth®, Sigvaris®, and Jobst®; 3) Largest part of the calf (level C) for Medi-Bayreuth®, Sigvaris®, and Jobst®. Only these international brands are available in the Indian market. We compared these measurements with the standard sizing tables available from Medi-Bayreuth®, Sigvaris®, and Jobst®.

Results: The measurements found do not allow a satisfactory adaptation of compression stockings marketed in India by Medi®, Sigvaris®, and Jobst®. The risk of threading difficulties is 15% with medi® and Sigvaris® compression stockings. The risk of slippage is 61% for Sigvaris® and 48% for Medi®. With the Jobst® sizing table, no knitting makes it possible to reach a pressure at point C equal to at least 50% of the pressure of point B.

Conclusions: These data underline the need to adapt the measurements of compression stockings to the morphologies of patients' lower limbs in India and in each country where manufacturers would like to sell their products.

e-poster number 113

COMPRESSION THERAPY IN LYMPHOEDEMA: IS IT COST-EFFECTIVE?

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Objectives: The pathology of lymphedema is becoming more and more frequent, as more than 100 million people suffer from this disease worldwide. This disease can affect the lifestyle and productivity of the patients. The aim of the study is to evaluate early safety and efficacy of compression therapy of lower or upper limb lymphoedema.

Material and methods: This study was conducted upon 100 patients with lower and/or upper limbs lymphoedema from November 2011 to October 2018 at Al Azhar university Hospital, New Damietta. Seventy-two patients were females, and 28 were males. Eighty-six patients were presented by lower limb lymphoedema (six of them were bilateral), and 14 patients were presented by upper limb lymphoedema (two of them was bilateral), who were presented by primary or secondary lymphoedema with exclusion of infected, ulcerative, or ischaemic limbs. Measurements of sound and oedematous limb circumferences were recorded at three different fixed points before bandaging and after removal of the bandage. Before bandaging, application of combinations of local steroids, antifungal, and antiseptic in cream formula all over the limb to be covered was done. Then multilayer bandaging starting with gauze bandage, Mobiderm, short stretch bandage, and elastic bandage (with compression around 30 mm Hg), were applied in order continuously for one week, then removal of all layers and clinical revaluation were done at the first time and weekly for the next three weeks. last layer was removed during the time of bed rest in the last three weeks of compression therapy.

Results: For 100 patients, over a period of one to two months of clinical follow-up, there was marked reduction in limb volume and improvement of all patient's quality of life without significant complications, but the patients still required compression stockings.

Conclusions: Compression therapy of lower or upper limb lymphoedema by using multilayer bandaging with Mobiderm is very cost-effective because as its application is fast and easy, and oedema resorption and improvement of fibrosed tissues are rapid.

e-poster number 114

ATRAUMATIC WOUND DRESSING IN VENOUS TROPHIC ULCER TREATMENT

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Objectives: Venous trophic ulcers require surgeons to search for effective and reliable methods of treatment.

Material and methods: Hospital treatments of 78 patients with venous trophic ulcers (VTU) of lower extremities (mean age 55 years) were studied. Basic therapy included Flebodia 600 one tablet in the morning, for three months, antibiotic treatment, Sulodexidum 600 LE for 10 days, and then 250 LE two times per day for 30 days, and compression treatment of the second class. Patients were divided into three groups with different treatment methods. In the first group (n = 20) – local treatment of VTU was carried out with daily wound dressing of water antiseptic solutions. The second group (n = 28) used water-soluble ointments exudation phase one time every two days, and then in the second phase of the wound process zinc hyaluronate once every two days. In the third group (n = 30) firstly Voskopran with Dioxydin 5% ointment once every two days was used, and in the second phase of the wound process Voskopran with Methyluracil 10% ointment once every two days was implemented. In the patients with significant pain syndrome Gelepran with Lidocaine was used.

Results: All patients in the first group had pain, heaviness in the legs, hyperaemia, and oedema near the ulcer within the first 14-16 days. In the second group 18 (64.3%) patients had such symptoms that persisted for seven days. In the third group 20 (90%) patients had the symptoms for seven days, and the others had it for 10 days. In all groups, on the first day, the prevalence of inflammatory (42%) and inflammatory-degenerative (58%) types of cytograms was revealed. On the 14th day, in the first group, the inflammatory-degenerative type decreased by 40.2%, in the second group by 52.8%, and in the third group by 75.6%. Regenerative type on the 14th day in the first group was detected in two (10%) patients, in the second group in 13 (46.4%) patients, and in the third group in 26 (86.6%) patients. In all groups, the microbial spectrum of venous ulcers did not differ practically before treatment and the wounds were not sterile. After 14 days, in the first group the lack of the microflora was observed in 49.2% cases. In the second group there were no microflora in 75.2% of cases. In the third group there were no microflora in 96.2% of cases. In the first group transition of the wound process in the second phase was noticed at 16 ± 2 days, in the second group at 14 days, and in the third group at 10 days.

Conclusions: The use of modern dressings in the complex treatment of venous trophic ulcers of the lower extremities leads to more rapid and lasting results.

e-poster number 115

THE EFFECT OF EXTERNAL COMPRESSION ON INTRAMUSCULAR PRESSURE

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Objectives: External leg compression is used in the treatment of several conditions of the leg. It can also be an undesired effect from casts. External compression increases the pressure in the underlying tissues. The increase is usually described as an additive to the tissue pressure. However, some reports on tissue pressure during compression do not fully support this. To improve the understanding of the effects of compression on, for instance, a vessel, the pressure distribution needs to be understood. Pressure is distributed by hydrostatic pressure and pressure acting on solid components. Recently, computer simulations have revealed that the pressure distribution from compression is highly dependent on the degree of free fluid in a tissue, thus suggesting that pressure is distributed differently in patients with e.g. oedema and compartment syndrome. The objective was therefore to measure the intramuscular pressure (IMP) during compression both in patients with chronic anterior compartment syndrome (CACS) and in healthy subjects.

Material and methods: The study comprised 12 CACS patients and eight healthy subjects with no history of leg pain requiring medical attention. IMP in the anterior compartment of the leg was recorded with a non-infusion technique at rest after an exercise test was conducted, which was designed to elicit muscle swelling and an elevated IMP. External compression was applied by a wide tourniquet placed on the leg, stepwise inflated from 0-160 mm Hg in 10-second intervals. All recordings were done with the participants in supine position with the foot on a low heel support, thereby avoiding extra pressure on the calf.

Table 1. Intramuscular pressure (IMP) as a function of external compression

External compression (mm Hg)	CACS patients Mean IMP±SD (mm Hg)	Control subjects Mean IMP±SD (mm Hg)
0	47±12	21±8.8
40	74±9.4	53±5.7
80	104±6.2	90±6.0
120	138±7.4	127±7.7
160	177±5.5	167±8.2

Results: Linear regression on normalised IMP yielded $y = 0.81x - 4.0$ for the CACS patients (r = 0.997) and $y = 0.92x - 2.3$ (r = 0.999) for the controls.

Conclusions: As expected, the baseline IMP was increased in both groups compared to the typically reported 5-11 mm Hg in healthy subjects at rest. This baseline increase is due the volume load induced by the exercise test. Linear regression revealed that the pressure transfer was different in patients with CACS compared to healthy subjects. The pressure increase due to external compression was sub-additive to the baseline IMP despite the fact that the compartment had an increased fluid volume load from the exercise test. Further studies are needed to establish the pressure distribution in other compartments as well as in other tissues. In conclusion, the intramuscular pressure is a sub-additive function of external compression.

e-poster number 116

NURSES EDUCATION PROGRAM FOR DECREASING VASCULAR ACCESS DEVICE THROMBOSIS AND INFECTION

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Objectives: To develop and implement a nurses' educational program for venous port management.

Material and methods: Project was created step-by-step. First, standard operational procedure for infection control and device manipulation with a check-list was created. Second, two types (adult and children) of device simulator were developed by engineers and built by 3D-printing technology. Every nurse was taught how to operate through the check-list (needle insertion, medication administration, device closure by anticoagulant lock, indications and technique for needle removal), initially with simulator and, after assessment by the program director

(experienced intensive care physician), in patients. Training quality was self-assessed by nurses by questionnaire.

Results: Sixteen nurses (two male, 14 female) were educated and assessed. Education staging by simulation with unrestricted attempts for manual training followed by real hands-on education with the patient was effective. Mean course time was three days. Students had an opportunity to come back to the simulator in the case of any difficulties in real clinical practice. The mean satisfaction rate was 96%. Check-lists were implemented in daily practice to avoid errors and algorithm deviations.

Conclusions: Staff education by simulation followed by hands-on training is an effective and easy-to-perform method. Vascular access simulators created by 3D-printing technology are helpful in the initial stages of nurses' education. Clinical effectiveness of this program should be assessed by complications due to differences in analysis (performed in the next step).

e-poster number 117

LYMPHANGITIS TREATMENT IN MEXICO

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Lymphangitis is a pathological condition characterised by an infectious and/or inflammatory process of the lymph nodes and interstitium, regardless of its aetiology, which may include the skin and soft tissue. It includes multiple predisposing factors: alcoholism, hypovitaminosis, mycosis, immunodeficiencies, malnutrition, diabetes mellitus, micro trauma, and remote sepsis. World literature reports a frequency of 10-100 per 100,000 inhabitants per year, and of these, approximately 80%-90% are in the lower extremities. In Mexico, the main aetiology has been detected in Escherichia coli, Staphylococcus aureus, Staphylococcus epidermis, and Pseudomonas aeruginosa; all these aetiological agents are isolated through direct culture of patient lesions. Being the most important antibiotic with sensitivity to moxifloxacin, cephalexin, and clindamycin and presenting resistance to most of the first-line, second-line, and third-line antibiotics according to the world literature. Patients studied with lymphangitis: 115 patients, of whom 80% responded to moxifloxacin, 15% to clindamycin, and 5% to cephalexin with treatment as monotherapies. In the rest, a combination of these had to be made. The study detected that the indiscriminate use of penicillin, amoxicillin, and cephalosporin has led to the generation of bacterial resistance, which generates bacterial resistance and the use of different antibiotics to the lines recommended by the world literature. Among the types of lymphangitis seen, there was acute lymphangitis, of which 60% were reticular and 90% truncal and deep; patients with chronic lymphangitis were ruled out because this is mostly caused by external agents such as parasites or viruses.

e-poster number 118

COMMUNITY LEVEL LYMPHOEDEMA CARE IN A FILARIA ENDEMIC ZONE

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Objectives: India is among the countries in which filariasis is prevalent, but its incidence is declining across the world due to active participation in the WHO mandated Program of Elimination of Lymphatic Filariasis (PELF). However, secondary problems, especially lymphoedema, are expected to continue for at least another decade. The incidence of lymphoedema overall increases with longevity and rising incidence of injuries, diabetes, and venous disease, but it has also not been considered a serious problem worthy of attention until it is very late. As compared to urban areas, persons in far-flung areas are even more neglected because of problems of reach. The missing factor is the knowledge of how to manage such problems. This lack of knowledge needs to be upgraded, and use of telemedicine technology can be a great boon in this aspect. Lymphoedema treatment is largely long term and can be domiciliary or community based. Diagnostic modalities like examination and history taking can be done and reviewed online. Hints on how to manage the problem properly are then provided aided by visualisation, which done in real-time using Video conference (VC) or through store and forward (S&F) of shared patient data. Hospitalisation is required only for a short while, when there is need for a procedure.

Material and methods: We have organised camps to introduce this concept in many places, including filaria endemic regions. In the Sitapur District of Uttar Pradesh India, two camps were held in which concepts of CDT, especially skin care and compression bandaging, were explained to local volunteers as well as patients. Software was provided for monitoring and follow-up advice provided as required via VC. During the camps, patients were examined, and those with higher grades of lymphoedema were provided bandages with training in how to apply them, along with other aspects of self-care. All the patients would meet every month thereafter for follow-up assessment review and collection of penicillin tablets. VC and S&F was used for monitoring.

Results: Two camps (November 2015 and January 2017) were held for filariasis management in a government facility, which included surgery for Hydrocoel. Follow-up results to February 2018 were analysed. Among the 147 total patients there were 61 with grade 2 or 3. These showed an immediate volume reduction of 38%, which improved further to 73% over the long term (average follow-up of 7.3 months).

Discussion: Volume reduction in the long term at the authors' own clinic, where there are more complicated and late cases, averaged

approximately 60%. Another reason for the better results at the community level is better and more consistent follow-up and care locally.

Conclusions: Lymphoedema care and provision of CDT at the community level should be an important feature of the WHO's Morbidity Management and Disease Prevention (MMDP) component of PELF.

e-poster number 119

LYMPHOEDEMA – EXPERIENCE FROM A TROPICAL COUNTRY

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Objectives: Our comprehensive Lymphoedema care centre was setup in 1996. In 2010 we added the services of a trained counsellor, who was trained in CDT. Another change was usage of sequential IPC pumps in lieu of single chambered. Since then the results have improved remarkably.

Care protocol: Patients are counselled, and complex decongestive therapy (CDT) is initiated by compression through bandaging and pumps administered in the clinic over a few days. Long-term penicillin is prescribed if there is evidence / doubt of infective episodes. Surgery (debridement, nodo venous shunts, and debulking) is undertaken as required. Home-based maintenance is strictly advised as follow-up through bandaging /garments as well as pumps if affordable.

Material and methods: All patients undergo an initial counselling followed by general examination including serial limb measurement at fixed points. Limb volume is calculated through Medic Aid® software. Possible reduction was by comparison with the opposite side or using a nomogram calibrated to BMI if B/L disease.

Results:

Table 1. Patients with empirical diagnosis of lymphoedema

	Total	Lympho-edema	Ulcer	Varicose veins	Legs	Arms	Age (avg)
Patients	668	581	53	52	467	73	46.7
Males	311	250	42	37	229	7	44.9
Females	357	331	11	15	238	66	47.9

Further classification for those with ICD codes of I89.0/1 (271), I97.2 (18) or Q82.0 (2) I83 (3) (also see bar chart on associated findings)

Overall satisfaction was revealed by reduction in incidence of ADLA attacks from an average 3-4 per year to occasional if at all. Worsening of the few patients who did was related with ADLA attacks.

Conclusions: Results of CDT have improved over the years thanks to better materials, as well as availability of a trained team. Counselling related to ensuring a home care regime is important.

Table 2. Limb grading before, between, and at various stages of treatment

Grade	Initial	At end of treatment	Immediate	Short term	Long term
Stage III	24	9	11	5	2
Stage II	30	16	10	7	4
Stage I	45	35	25	20	5
Stage 0	23	62	49	26	9
Total limbs	122	122	95	58	20
Average improvement in volume			47.75	50.38	31.68
Minimum or worsening			−14.18	−29.29	−70.76
Maximum			100	98.72	90.99
Average ignoring negatives			48.95	52.69	53.79

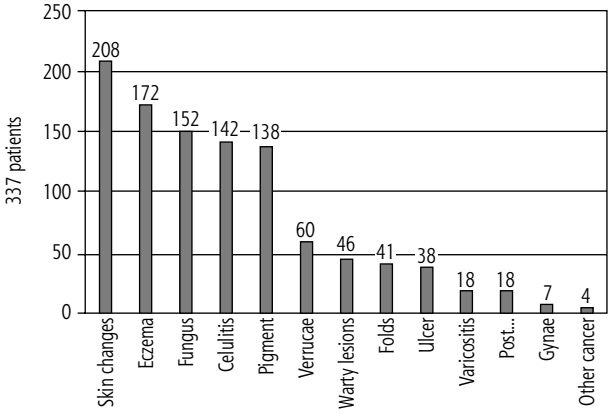

Fig. 1. Associated problems

e-poster number 120

LEG TISSUE OEDEMA HAMPERS HEALING – MODERN METHODS FOR DETECTION OF FLUID LOCATION AND CONCENTRATION

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Objectives: Oedema of tissues accompanies leg cellulitis, ulcers, venous, and lymphatic stasis. Although it is a positive inherent component of inflammation, intercellular fluid excess may lead to damage of tissue structure as epidermal desquamation, infection, ulcers, and subsequent fibrosis. Moreover, mechanical wound healing is impaired. Aim of the study was to prove the efficacy of modern tissue oedema fluid detection methods and hints for effective fluid evacuation.

Material and methods: The following methods were applied in 100 legs with lymphoedema, cellulitis, and non-healing ulcers: dielectric constans – subepidermal water, bioimpedance – electric conductivity depending on extracellular water contact, durometry – skin stiffness, deep tonometry – subcutaneous tissue stiffness, fluid mobilisation force meter, visualisation by indocyanine green fluorescence, lymphoscintigraphy, tissue spaces X-ray, ultrasonography (US), and MRI. All these methods provide data on the oedema fluid volume necessary for evaluation of compression procedures.

Results: Oedema parameters were similar in all listed pathologies, either in the entire limb or in inflamed fragments. Subepidermal water > 40%, bioimpedance Ldex > 10, skin stiffness > 0.8 Newtons, deep tonometry > 1 kg/sq.cm, fluid mobilisation > 50 mm Hg, ICG fluorescence level 40-60%, lymphoscintigraphy – subdermal accumulation, US – fluid "lakes" and MRI honey-comb image. Images will be presented.

Conclusions: Compression therapy to decrease oedema and inflammation and facilitate healing of ulcers should be applied based on oedema fluid physical parameters.

e-poster number 121

BACTERIA ARE PRESENT IN SUBCUTANEOUS TISSUE IN OBSTRUCTIVE LYMPHOEDEMA AND VENOUS INSUFFICIENCY – LONG-TERM PENICILLIN PREVENTS THEIR PROLIFERATION AND SUBSEQUENT HOST RESPONSE

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Objectives: Dermato-lymphangio-adenitis (DLA) occurs in about 50% of cases with obstructive lymphoedema of lower and upper limbs. Each recurrence is followed by progression of oedema and irreversible increase in limb size. The question arises whether bacteria are perma-

nently present in lymphoedematous tissues. The aim of the study was to identify bacteria in lymphoedematous, tissues, their location, migratory properties, and responsiveness to antibiotics.

Material and methods: A study was carried out on 50 patients with obstructive lymphoedema of lower limbs. Skin and subcutaneous tissue fragments were harvested under strict aseptic conditions in an operating room. Scalpel, forceps, and gauze were cultured. Bacterial fall-down was routinely measured. Specimens were placed on Hemoline plates and put into a warm box for 3-5 weeks. Bacterial strains from colonies were identified. In 18 cases skin and subcutis fragments were evaluated in scanning electron microscopy. Patients were given long-term penicillin for six months.

Results: On-plate culture revealed delayed migration and confluent colony formation around and on tissue fragments in over 40% of specimens. Strains were Staphylococcus epidermidis and other coagulase-negatives. Staphylococcus aureus methicillin-sensitive was the other most common. All were sensitive to standard antibiotics. In some cases, a slight resistance to penicillin was noted. On electromicrographs single extracellular cocci and bacilli were identified. No colonies were seen on plates. There were few macrophages close to bacteria.

Conclusions: Single bacteria are found in subcutis, with a lack of immune cells in their vicinity. These are most likely "dormant" bacteria. We speculate that permanent presence of penicillin keeps them in a non-proliferating state.

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e-poster number 122

EARLY DETECTION OF LEG SOFT TISSUE CIRCUMSCRIBED INFLAMMATION DAMAGING LYMPHATICS AND LEADING TO DEVELOPMENT OF LYMPHOEDEMA

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Objectives: Lymphoedema of lower extremities comprises the entire limb. This is most common in cases with recurrent attacks of cellulitis (dermatolymphangioadenitis, DLA) gradually destroying the main lymphatic collectors. However, at present the early diagnosis and appropriate antibiotic treatment of foot or calf infection may limit the spread of microbes and the region of inflammation. This is why we see more isolated lymphoedema regions in the foot or part of the calf only. On ICG imaging, confluent areas of dye at the site of inflammation with preserved flow in the dilated collectors can be seen. Early imaging of inflammatory areas by ICG lymphography may help in initiation of fast therapy. Aim of the study was to perform ICG lymphography in patients complaining of limited areas of oedema and inflammation of any part of the lower limb not diagnosed as lymphoedema.

Material and methods: Fifty patients presenting in OPC with circumscribed inflammatory regions of the foot, calf, or thigh without oedema of the limb underwent ICG lymphography, tonometry, and dielectric constant testing.

Results: Foot oedema. Confluent spread of ICG in the dorsum and plantar area. Outline of collecting lymphatics in the calf and thigh. Enlarged inguinal nodes. Calf oedema. Outline of dilated foot lymphatics. A confluent ICG spot embracing the lower part of the calf. Slight outline of thigh lymphatic. Enlarged inguinal nodes. Thigh oedema. Dilated collecting lymphatics of the whole limb, large ICG spots in the thigh with enlarged inguinal nodes. Tissue stiffness > 1.5 kg/sq.cm. Skin water concentration > 45%.

Conclusions: Early ICG lymphography depicts areas of lymphatic involvement in the inflammatory process. Immediate therapy may prevent the spread of damage to collecting trunks and nodes.

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e-poster number 123

LEG ULCER – NEAR INFRA-RED INDOCYANINE GREEN AND ISOTOPIC LYMPHOGRAPHIES DETECT SITES OF PREDILECTION FOR FORMATION – HINTS FOR PREVENTION THERAPY

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Objectives: The pathogenesis of leg ulcers is complex. Venous stasis, skin trauma, colonisation by foot and perineal microbiome are the predisposing factors. Autoimmune reaction to damaged tissue antigens develops. Around 20% of patients suffer from recurrent systemic allergic reactions. Inguinal and retroperitoneal lymph nodes become enlarged. How can we foresee the development of ulcers? Subclinical "cryptic" sites of inflammation in skin and subcutaneous tissue should be detected before necrotic changes develop. Inflamed tissue capillaries become "leaky" and plasma proteins accumulate. These sites can be identified on lymphographies. Aim of the study was to perform indocyanine (ICG) and isotopic (Nanocol) lower limb lymphographies in patients with advanced leg oedema.

Material and methods: One hundred randomly selected patients suffering from leg oedema stage II and III (mid leg circumference > 5 cm, painful erythematous calf skin, no ulcer) were studied. ICG and lymphographies of lower limbs were carried out. Sites of extra-lymphatic tracer accumulation were identified and the radiation level measured. Preventive measures such as i.m. long-term penicillin, topical nanosilver cream on mid-calf skin, and bandaging 40 mm Hg were applied for six months.

Results: In over 90% of cases ICG and Nanocoll showed areas of accumulation above the ankle joint, dilated peripheral lymphatics, and enlarged inguinal and, in 30%, popliteal lymph nodes. The ICG fluorescence level in the accumulation foci was on average 30-40%. The Nanocol radioactivity ratio was 1.2 (affected vs. normal calf). On clinical evaluation in the six-month follow-up no ulcer was formed, erythema area decreased, and skin colour turned brownish.

Conclusions: ICG and isotopic lymphographies visualise sites of calf tissue inflammation where ulcers may be formed.

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e-poster number 124

LYMPHOEDEMA CLINICAL PRACTICE GUIDELINES – WHAT IS AGREED?

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Objectives: In the United Kingdom, it is estimated that 200,000 patients suffer from lymphoedema. Clinical practice guidelines (CPGs) exist to guide the diagnosis and management of lymphoedema, but to confidently apply such CPGs into practice, these should be of adequate quality, which is achieved through rigorous evidence-based methodology. This study aims to determine the methodological quality of current lymphoedema CPGs to assist healthcare professionals in selecting high-quality CPGs to guide their practice, and to identify areas for improvement in future CPGs.

Material and methods: Medline, EMBASE, and online CPG databases were searched systematically up till 31 January 2019. Evidence-based, full-text CPGs that reported on recommendations in lymphoedema diagnosis and/or management in English were included. Expert consensus documents, CPG summaries, or CPGs that were not freely available were excluded. Two reviewers performed the literature search and assessed methodological quality using the Appraisal of Guidelines for Research and Evaluation II (AGREE II) instrument. Inter-reviewer reliability was determined using intraclass coefficients (ICCs) calculated using a two-way mixed model. Raw and scaled quality scores were obtained following methods detailed in the AGREE II instrument. Any scoring discrepancies were discussed with a third reviewer. An overall

scaled quality score of ≥ 80% was considered of adequate quality to recommend use in clinical practice.

Results: Six relevant CPGs were identified from the literature search (2004-2014). One was then excluded because its full text could not be obtained, and only five CPGs were assessed. There was very good inter-reviewer reliability (ICC = 0.993, 95% CI, 0.987 to 0.997). No single CPG scored highest in all domains, with significant methodological heterogeneity observed across the CPGs. Performance was noted to be poor in domains 3 (mean scaled score 32.9 ±21.7%), 5 (21.3 ±13.69%), and 6 (18.3 ±29.1%). No CPG achieved an overall scaled quality score of ≥ 80%, with the top CPG scoring 75%.

Conclusions: Based on predefined criteria, no CPG was considered adequate for recommended use in clinical practice. All CPGs on the diagnosis and/or management of lymphoedema showed areas for improvement, with elements of methodological quality lacking. This is particularly so with respect to development rigour. A structured approach, which may be guided by the use of CPG creation tools and checklists, should help development groups to improve the quality of future lymphoedema CPGs.

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