

ABSTRACTS

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Ultrasound-guided foam sclerotherapy for the treatment of chronic venous ulcers

Aleksandra Jaworucka-Kaczorowska, Marek Jaworucki

Centrum Chirurgii "Jaworucy" Sp. P., Gorzów Wlkp.

Background: Chronic venous ulcers (CVU) are quite common and generally have low healing rate (HR) and frequent recurrence rate (RR). Compression therapy is the mainstay of treatment but the long-term results are often insufficient. Elimination of axial and perforator reflux has been suggested as an adjunctive therapy with compression to reduce RR and accelerate healing. Ultrasound-guided foam sclerotherapy (UGFS) is well known, safe, clinically effective and minimally invasive method used for ablation of superficial venous reflux (SVR) for CVU.

Aim: To determine HR at 24 weeks and 12 months and ulcer RR at one year after UGFS of SVR in patients with open (clinical, etiologic, anatomic and pathophysiologic [CEAP] classification, C6) CVU.

Material and methods: Thirty-six patients of median age 62 (interquartile range 36–92) years underwent UGFS for SVR in addition to compression for treatment of CVU of median duration 10 (IQR 3–60) months. There was a history of DVT in 6 limbs and 5 patients were on warfarin because of cardiologic reasons. Five patients underwent varicose veins surgical treatment in the past. No limbs had significant arterial disease. Prior to and 1, 3, 6, and 12 months after treatment patients underwent clinical and duplex assessment.

Ulcer dimensions were recorded at each visit to calculate healing rates. An obtained database was analysed to determine venous occlusion rates, 24-week and 12-month healing and recurrence rates.

Results: Thirty-one from 36 patients (86%) required more than one session of treatment for complete occlusion of great or small saphenous vein, incompetent perforators and varicosities. The 3, 6 and 12-month HR were 72.2%, 91.6% and 97.2%, respectively. One leg ulcer didn't heal 12 months after the first UGFS. The patients with isolated axial reflux had higher HR than those with axial and perforator incompetence or those with isolated perforator incompetence. The median healing time was 3.45 months (IQR 1–15 months). The estimated 12-month recurrence rate was 8.33%. It was observed that duration of ulceration, large initial ulcer area, history of previous ulcers and deep vein thrombosis and previous surgical treatment of varicose veins had an influence on HR and RR.

Conclusions: Ultrasound-guided foam sclerotherapy appears to be an attractive minimally invasive technic to treat SVR in patients with CVU and is associated with high HR and low mid-term RR.

The assessment of polymorphisms of thrombophilia-associated genes and MMP-9 gene, as independent risk factors for development of venous leg ulcer

Alicja Krejner, Małgorzata Litwiniuk, Krystyna Twardowska-Sauchka, Iwona Radziejewska, Justyna Wilczko, Cezary Szary, Agnieszka Krawczyk, Naser Dib, Tomasz Grzela

Pracownia Biologii Molekularnej Komórki, Warszawski Uniwersytet Medyczny
NASMED – Klinika Flebologii, Warszawa
MEDSERVICE, Zabrze

Molecular background of venous leg ulcer (VLU) development remains unclear. Higher susceptibility to VLU formation, or slower healing, observed in some patients, may suggest the role of individual predispositions, e.g. genetic factors. Recently, it has been found that important role in VLU pathogenesis may play hyperactivation of metalloproteinase (MMP)-9, possibly due to single nucleotide polymorphism (SNP) of MMP-9 gene.

Venous thrombosis (VT) is known to increase the risk of VLU. On the other hand, VT risk is associated with thrombophilia. It has been suggested, that thrombophilia may directly increase risk of VLU, however, till now there is no data to verify this thesis. Therefore, the aim of the study was to assess an occurrence of selected SNPs of MMP-9, and common pro-thrombotic SNPs in patients with VLU vs. control group.

The analysis of SNPs of MMP-9 (Q279R and R668Q) and pro-thrombotic factors (F2 G20210A, F5 R506Q and MTHFR C677T), was performed on DNA samples of VLU patients ($n = 213$) and control group ($n = 238$), using CVD-Strip Assay and TaqMan SNP Genotyping Assay. The genetic data were then correlated with some clinical parameters, including healing time, wound recurrence and history of VT episodes.

It has been found that presence of single MMP-9 SNPs (279R or 668Q) slightly increased risk of VLU development, independently of VT history. However, coexistence of SNPs increased the VLU risk proportionally to the number of risk-associated alleles.

Higher frequency of pro-thrombotic SNPs – F2 20210A, F5 506Q and MTHFR 677T, was observed only in VLU patients with VT history. It may support the assumption that mentioned SNPs are indirect risk factors for VLU development.

Our results suggest that genetic tests may be helpful in assessment of individual risk for VLU development or recurrence. However, verification of their clinical value requires further studies.

Endovenous steam ablation of great saphenous vein insufficiency using the steam vein sclerosis (SVS™) device: one-year results of a prospective series

Kamil Bury^{1,2}, Maciej Pawlak¹, Michał Zdunek^{1,2}, Piotr Gumiela¹, Łukasz Znaniecki¹, Maciej Brzeziński¹, Magdalena Bury², Jan Rogowski¹

¹Department of Cardiac and Vascular Surgery, Medical University of Gdansk

²AKUMED Vein Center, Starogard Gdański

Aim: This study evaluated the feasibility, safety and 1-year results of steam vein sclerosis endovenous ablation (SVS-EVSA) of great saphenous vein (GSV) insufficiency.

Design: Prospective cohort study.

Material and methods: Primary outcomes were treatment success (vein obliteration) at 2 weeks, 2, 6 and 12 months, with evaluation of venous clinical severity score (VCSS) at 12 weeks. Secondary outcomes were, initial technical success, pain (VAS score), satisfaction with treatment, duration of analgesia use and days lost from daily activities.

Results: A total of 178 legs were treated. Initial technical success was 100%. At the 6-week assessment, all treated veins remained occluded. The 1-year follow-up duplex showed anatomic success in 93% (95% confidence interval: 0.87–1).

Venous clinical severity score decreased significantly from 5.5 (interquartile range (IQR) 2–12) before treatment to 1.0 (IQR 1–3, $p < 0.001$) at 8 weeks and to 1.0 (IQR 1–2, $p < 0.001$) at 1 year. Median procedural VAS score for pain was 2 (IQR 2–4). No major complications were observed, especially no nerve injury.

Conclusions: SVS-EVSA is a safe, feasible and efficacious technique for treatment of GSV insufficiency. One-year follow-up shows a 93% anatomic success rate, no major complications and patient high satisfaction rate.

Key words: varicose veins, great saphenous vein, varicose veins therapy, SVS.

Tumescence assisted sclerotherapy in the varicose vein treatment – own experience and method efficacy in the daily clinical practice

Piotr Hawro¹, Tomasz Urbanek^{1,2}, Wojciech Mikusek¹

¹Center of Phlebology ANGELIUS, Katowice

²Department of General and Vascular Surgery, Medical University of Silesia, Katowice

Tumescence assisted echosclerotherapy (TAE) is an interesting modification of the traditional sclerotherapy

leading to the sclerosant volume decrease as well as to the potentially better sclerosant efficacy in the cases of large vein sclerotherapy. In the paper, the authors present their experience based on 40 TAE cases concerning great and small saphenous vein as well as perforating vein sclerotherapy. The maximum diameter of the treated vein was 15 mm and the maximum length of the treated vein up to 40 cm. In all the patients traditional tumescence solution (including lidocain, epinephrin, natrium bicarbonate and physiological saline) was used. As the sclerosant solution 2–3% aethoxysclerol was used. The patients were followed up from 1 to 4 years. The authors present their early and long term results as well as the potential treatment difficulties and the suspected reasons for the treatment failure. Despite the conflicting results published in the recent literature, TAE seems to be the promising, relatively easy and cheap method of large vein sclerotherapy.

Bacteriology of varicose veins – their presumptive role in pathogenesis of ulcer formation

Waldemar Lech Olszewski, Maria Mościcka, Ewa Swoboda, Marzanna Zaleska, Marek Durlik

Background: One of the hypotheses of leg venous ulcer etiology is, beside of venous insufficiency, bacterial damage of vein wall by microbes penetrating accidentally injured foot skin. Invading bacteria enter lymphatic and venous circulation through capillary wall, adhere directly to endothelial cells or are phagocytized by granulocytes adhering to venous wall, a well documented phenomenon. Damage of the vein wall causes secondary changes in adjacent skin. Eventually, ulcer may be formed. Ulcers are then secondarily colonized by bacteria dwelling on neighboring skin and by microbes floating down on desquamated perineal epidermal cells. **Aim:** To identify bacterial cells and their DNA in varicose veins (C2 CEAP classification) and leg venous ulcer (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 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 colonized foremostly by *Staphylococci* both aureus and coagulase-negative, however, ulcers also revealed presence of gram-negative bacilli. Genetic similarities between skin and vein staphylococci was found in 85%. Fifty-two percent of varicose vein specimens were infiltrated by granulocytes and macrophages.

Conclusions: Bacterial colonization may be a factor in the pathomechanism of damage of lower limb superficial veins (varices) and facilitating formation of venous ulcers.

Steam vein sclerosis (Tribvein) – endovenous ablation of infrageniculate great saphenous vein for persistent venous stasis ulcers is safe and feasible method of treatment

Kamil Bury^{1,2}, Maciej Pawlak¹, Michał Zdunek^{1,2}, Piotr Gumieła¹, Łukasz Znaniński¹, Maciej Brzeziński¹, Jan Rogowski¹

¹Department of Cardiac and Vascular Surgery, Medical University of Gdansk

²AKUMED Vein Center, Starogard Gdański

Background: The aim of the study was to show the results of the use of steam vein sclerosis (SVS, Tribvein catheter) endovenous ablation for treatment of the below-knee great saphenous vein segment in patients with venous stasis ulcers persisting after above-knee great saphenous vein ablation or surgical excision.

Material and methods: This study includes 25 patients with persistent C₆EpAsPr ulcers following above-knee great saphenous vein ablation with or without incompetent perforators. Patients underwent Steam Vein Sclerosis (SVS™, cermaVEIN, Archamps, France) procedure between June 2013 and April 2014. They were treated using steam vein sclerosis device with Tribvein catheter. Endovenous ablation approach was followed by compression stockings therapy.

Study protocol initially assumed control visits with duplex ultrasound examination (DUS) at day 7 and 30, 3 and 6 months postoperatively. If needed visits were performed weekly until the wound was healed.

Results: Twenty-five patients (9 men and 16 women) with average ulcer, size of 4.7 cm². Mean follow-up time was 13.6 months. There was no nerve injury, no deep vein thrombosis (DVT) or any other severe complications after SVS ablation. The average healing time was 34 days, compared with a mean of five months in traditional method respectively.

Conclusions: Steam vein sclerosis using Tribvein catheter – as an endovenous ablation method is safe and feasible in the subset of patients with below-knee great saphenous vein insufficiency with coexisting venous

ulcers. SVS has very high patient satisfaction rate at very low rate of complications.

Key words: endovenous ablation, ablation of great saphenous vein, venous stasis ulcers, infrageniculate great saphenous vein ablation, steam ablation, SVS.

Is intermittent compression effective in moving tissue fluid in legs with ulcers?

Marzanna Zaleska, Waldemar Lech Olszewski

Background: Posttraumatic edema of limbs, developing subsequently to wounds and fractures, is effectively treated by massage moving mobile tissue edema fluid (TF) toward the root of extremity. Excess TF forms natural subcutaneous channels conducting fluid to groin region. The flow pathways end up at inguinal crease, where skin is connected by elastic fibers with inguinal ligament and external oblique muscle. The question arises how effective may intermittent compression be in evacuating TF from the inflamed regions and whether the accumulated TF can form natural subcutaneous channels crossing inguinal crease to hypogastrium and gluteal region. This would facilitate absorption of TF in non-edematous tissues. Such newly created flow pathways would justify treating posttraumatic edema with intermittent compression devices.

Aim: To study the efficiency of evacuation of excess TF from injured regions.

Material and methods: We used lymphoscintigraphy to study pathways of lymph and mobile TF flow in 30 posttraumatic lymphedema stage II and III pts during pneumatic massage of limb: a) from traumatized tissues to the inguinal region and b) across inguinal crease to healthy non-swollen tissues of hypogastrium and gluteal region.

Results: (i) in 21 pts pneumatic compression pushed isotope in lymph in few still functioning lymphatics and TF in interstitial space toward inguinal region and femoral channel, (ii) in none was isotope crossing inguinal crease or flowing to gluteal area. Densitometry of lymphoscintigraphic images showed increase in thigh isotope from mean 2.4% before therapy, to 25.7% after 6 and 37.2% after 10 months of compression.

Conclusions: Intermittent pneumatic compression is effective in pushing mobile tissue fluid from the injured region and relocating large fluid volumes toward groin. However, it does not cross inguinal crease. This needs redesigning of sleeves adding chamber compressing inguinal area inflated to higher than distal chambers' pressure. Another approach is implantation of tubings bypassing the swollen limbs.

Do we still have technical contraindications to laser endovenous treatment?

Adam Zieliński, Łukasz Rdzanek

Centrum Medyczne doktorA, Warszawa

As it is now more than 15 years of experience in the field of laser endovenous ablation of great saphenous vein (GSV) and small saphenous vein (SSV), phlebologists can review huge number of cases treated by means of this method. We can observe not only an improvement of the efficacy of the method, but also many equipment changes and technical modifications on the field of surgical approach during the procedure.

Due to implementation of longer wavelengths of laser light and new types of fiber tips over the last five years, we now can perform many laser procedures in the patients who would have never been treated by endovenous ablation several years earlier.

In the presentation we show that some previously highlighted technical contraindications to the laser treatment can be successfully overcome. From the practical point of surgical approach, upon of 8 years of personal experience with endovenous lasers, we present cases how to treat patients with:

- dilatations of GSV trunk,
- extremely superficial GSV trunk,
- tortuous GSV trunk,
- intravenous remnants of thrombosis in GSV or SSV,
- very thin GSV or SSV trunk at the site of desired puncture approach.

We also discuss cases with some general contraindications to the laser procedure like: hypercoagulable states, superficial thrombophlebitis and hypersensitivity of the patients to the thoughts about the interference in their body.

Sclerotherapy for the treatment of leg ulcers in venous insufficiency

Andrzej Popow

Private Surgical Clinic, Hajnówka

Leg ulcers of lower limbs are a serious problem in both social and economic aspects of the country, which affect not only older people, but also patients of working age.

Expenditure on social security benefits associated with the inability to work due to venous insufficiency in the years 2010 and 2011 in Poland amounted to 0.8% of the total, while the proportion due to ulcers was 0.4% of the total. In 2010–2011, the average length of absence: due to sickness was 12.23 days, those associated with venous insufficiency – 13.8 days, while those with ulcers – 15.80

days. These are important indicators of the status of the problem. The aim of this study is to evaluate the efficacy of combined treatment of venous ulcers using sclerotherapy, compression therapy and topical therapy in patients with long disease duration, who had previously been treated with only slight improvement or none in other centres with no experience in the treatment of venous diseases. Subjected to examination was a group of 136 patients treated at the phlebological centre in Hajnówka. Surveys were sent to 351 patients treated between 2004–2011. Replies were received from 136 patients aged 36–88. Ultrasound scans were performed using Aloka's 3500 SX, linear probe, always by the same person. Evaluated was the size and time of reflux, incompetent veins diameter and the features supporting fresh venous thrombosis or a history of venous thrombosis. Measurement of ulceration size was made based on data such as length, width or diameter of the ulcer, obtained depending on the shape of the ulceration, which resembled the shape of a rectangle, square or circle. Based on the obtained data, a surface area was calculated using mathematical formulae. Reflux volume (V) was calculated according to the formula $V = xv$, based on parameters such as venous trunk diameter ($S = 2r$) and maximum reflux velocity (v). Wound debridement consisted in necrotic tissue excision and removal of excessive exudate with a sterile cotton roll saturated with Octenisept. Appointments to evaluate the efficacy of treatment were scheduled after 14, 30, 60 or 180 days. The results were statistically analysed using the company PQStat 1.3.0 Software and Microsoft Office Excel 2007. The following were used: Wilcoxon's nonparametric test, non-ANOVA nonparametric test of Kruskal Wallis, one-way ANOVA, Spearman's test and quantitative tests. For all the analyses statistical significance was determined at the level of $p < 0.05$. The age range of the study group was between 36–88 years. The study group was dominated by people with primary education – 42%, a large proportion of the patients with secondary education – 25% and vocational education – 24.1%. The vast majority of patients came from rural areas – 60.5%, urban areas up to 50 thousand – constituted 26%, those from the cities of 50–200 thousand – 8.2% and above 200 thousand – 5.2%. Mean BMI was 30.8, where 14.0% of patients were in the standard, obese persons constituted 46.3%, patients with overweight – 35.3% and severe obesity – 4.4%. Ulceration area comprised between 2 and 20 cm², of which the vast majority oscillated in the range of 4–5 cm². Superficial venous insufficiency occurred in 66.2%, mixed insufficiency – in 25.7%, deep venous insufficiency – in 5.2%, and perforator venous insufficiency – in 2.9%. Incompetent veins diameter ranged from 4.6 to 30 mm, the most frequent diameters were between 5 to 12 mm. The reflux volume before treatment was approximately 5 cm³/s, and following the treatment it decreased to 0 cm³/s. Reflux time before treatment amounted to > 5 s, after the treatment it was reduced to 0. 91.9% of patients

were not affected by deep venous thrombosis, 8.08% suffered from venous thrombosis. Before treatment at the centre, 46.3% of the patients were treated using monotherapy (the largest group), while at the centre 75.7% of patients were treated using combination therapy. Before treatment, ultrasound scan was performed in 50% of the cases, while at the centre ultrasound test was performed in 100% of patients. Before treatment at the centre complete healing occurred in 11.03% of the patients, and after treatment at the centre 70.59% of the patients reported completely healed ulcers. The duration of treatment before the treatment at the phlebologic centre in 37.99% of patients amounted to 11 years. After treatment at the centre, in 57.35% of the patients the ulceration healed within a period from one to six months. Before the treatment, the VAS index of pain averaged 6.7, whereas after the treatment it decreased to 2. Quality of life VAS index also decreased: before treatment it amounted to 6, and after treatment it decreased to 2 (0 stands for very good quality of life). Before treatment at the centre only 12% of the patients with superficial venous insufficiency were cured, but after the treatment at the phlebologic centre a 65% effectiveness was achieved. Body mass index is not significant in the treatment of ulcers. Ulcer size of less than 10 cm² ensures complete healing, while larger ulcers are more difficult to heal. Essential for the effectiveness of ulceration treatment is a proper diagnosis and a programmed, individualised procedure. The carried out studies indicate that combination treatment, including methods such as sclerotherapy, compression therapy and topical treatment, brings the desired results and allows to substantially improve the results achieved to date in the treatment of people affected by ulcerations of venous aetiology. Ultrasound scan is essential in assessing the type of venous insufficiency of the lower limbs, as well as allows the performance of ambulatory sclerotherapy treatment, without a stay at hospital, which significantly reduces the cost of treatment and improves patient comfort. The treatment at the phlebologic centre in Hajnówka not only accelerated the healing of wounds, but also significantly improved the patients' quality of life by alleviating pain.

An influence of the tumescent solution temperature on the post-operative pain in patients treated by the means of 1470 nm EVLT with radial 2ring fibers

Tomasz Pelak

Centrum Diagnostyczno-Terapeutyczne MEDICUS, Lubin

Current guidelines on treating lower limbs varicosity associated with main superficial vein trunks specify that endoluminal thermal ablation with laser light (EVLT)

or radiofrequency energy (RF) as the heat source is the preferred therapy. Both methods are minimally-invasive and systematically improved. Until recently, post-procedural pain intensity in EVLT was relevantly higher than in RF treatment but development of laser-based methods (and use of 1470 nm laser light, radial optical fibers as well as the latest introduction of double ring radial fibers) made this difference negligible. There is data evidencing that cooling the tumescent anesthetic solution favorably affects post-procedural pain's intensity.

The purpose of this analysis was to determine if reducing the temperature of the tumescent anesthetic solution additionally affected the post-procedural pain in the 1470-nm laser treatment with ELVeS Radial 2Ring optical fibers. The material used for the evaluation covers the author's 95 succeeding cases of treatment using tumescent anesthetic solution cooled down to 5 C deg. and 35 succeeding cases of treatment using the solution at room temperature. Intensity of the pain was assessed during follow-up visits on the basis of patient-declared need to use analgesics and their dose.

Venous thromboembolism as first manifestation of cancer

Konrad Tałasiewicz, Beata Jagielska

Department of Oncology and Internal Medicine, Maria Skłodowska-Curie Memorial Cancer Centre and Institute of Oncology, Warsaw

Venous thromboembolism (VTE) is one of the most common causes of morbidity and mortality among cancer patients. In about 12% of cases, such an episode occurs during the first hospitalization.

The appearance of venous thromboembolic complications such as deep vein thrombosis (DVT), superficial vein thrombosis (SVT) or pulmonary embolism (PE) is a negative prognostic factor, increasing the mortality rate of oncological patients by up to six times.

Patients suffering from cancer are at a high risk of such complications also because of scheduled or emergency surgical procedures, many years of chemotherapy and radiotherapy, or the common use of implanted venous access devices.

It is already known that the risk of finding cancer disease 12 months after VTE is high (for the lack of other explainable reasons). The remaining question to answer in everyday clinical work is when we should search for cancer among patients with VTE and how extensive such diagnostics should be.

Based on NCNN and ESMO guidelines, our experience and case reports from clinical practice, we are trying to provide answers to the questions listed above. In these cases we are also focusing on the main problems related to VTE treatment during oncological procedures.

This report based on case reports of our patients after their first VTE, who were later diagnosed with cancer. Each patient presented a different kind of a VTE event (PE, DVT, or SVT). All cases required the use of anti-coagulants. Such treatment often caused difficulty and required a multidisciplinary approach.

Iliac vein stenting – single centre experience

Jan Jakub Kęsik, Radosław Pietura, Michał Toborek,
Andrzej Paluszkiwicz, Piotr Terlecki, Tomasz Zubilewicz

Department of Vascular Surgery and Angiology, Medical University of Lublin

Background: Iliac vein stenting has proven to be a valuable alternative to conventional therapy. In this study, we report our learning curve and actual experience within the treatment of postthrombotic syndrome (PTS) using endovascular techniques.

Material and methods: From May 2013 to January 2015, 10 consecutive patients with PTS (7 woman and 3 men, mean age of 36 years) had endovascular treatment with stent placement. Stent patency was established venographically and in IVUS at the end of procedure, and was evaluated with Duplex ultrasound in follow-up.

Results: The initial treatment was technically successful in all patients. No perioperative complications and pulmonary embolism were observed. The first three patients had stent thrombosis during follow-up. One of them had successful repeated intervention. Clinical improvement was demonstrated by decreased pain and leg swelling.

Conclusions: Iliac vein stenting is an effective method of treatment with high late patency rate. The method is safe and it reduces symptoms in most cases.

Diagnosis and percutaneous treatment of venous malformation – single center experience

Radosław Pietura¹, Michał Toborek¹, Piotr Terlecki²,
Tomasz Zubilewicz²

¹Zakład Elektrodziagnostyki, Uniwersytet Medyczny w Lublinie

²Klinika Chirurgii Naczyń i Angiologii, Uniwersytet Medyczny w Lublinie

Aim: To evaluate the efficacy and safety of percutaneous embolization of venous malformations with alcohol.

Material and methods: Between September 2011 and May 2015, 48 patients (25 females; aged 42.18 ± 26.35 years) were treated percutaneously with 96% alcohol and

successfully followed. Overall 113 procedures were performed ranging from 1 to 4 procedures per one patient.

In all patients MRI was done before the procedure and the quality of life was assessed using a questionnaire. The same questionnaire was used before the next procedure (if needed) and when the treatment was finished. Usually an ultrasound was performed directly before and during the procedure.

Results: In 10 patients (20.8%) all symptoms of venous malformation disappeared. The next 21 patients (43.8%) showed significant improvement. Ten patients (21.8%) noticed some (but not significant) improvement and the rest – 7 patients (14.6%) showed no change or got worse.

Minor complications were seen in 7 patients (spontaneously healing ulcer, transient paraesthesia) and major complications in 2 patients (skin necrosis treated with skin grafting, nerve damage).

Conclusions: Percutaneous embolization of venous malformation is effective method of treatment, reducing symptoms and relieving pain in majority of patients.

The case of pelvic venous obstruction: from disease to design

Grzegorz Oszkinis, Łukasz Dzieciuchowicz, Michał Stanisic,
Łukasz Kruszyna

Department of General and Vascular Surgery, Poznan University of Medical Sciences

A female patient with restenosis of venous outflow was successfully treated by the implantation of two Vici-Venous stents. The pull-back release and segmental design accommodate precise positioning of the proximal stent at the iliac confluence and the distal stent at the level of saphenous vein inflow. Finally, the high radial force and optimal flexibility of the Vici-Venous stent resulted in outstanding dilatation and configuration of the stented segments.