

Integral Travel Award 2023 Winner Presentation

IS-1-1 Investigation of Risk Points for the Great Saphenous Vein and Saphenous Nerve in the Treatment of Lower Extremity Varicose Veins

Katsushi Oda
Kochi Vein Care Clinic

In the treatment of lower limb varicose veins, saphenous nerve (SN) injury is the most concerning complication. Historically, lower leg great saphenous vein (GSV) stripping has not been recommended due to the high incidence of SN injury, while endovenous laser ablation (EVLA) is not widely performed because of concerns about thermal injury causing neural damage. Since 2015, we have been performing lower leg laser ablation and has made efforts to prevent SN injury during the procedure. In this study, we report on the adjacent risk point (RO) of SN and the lower leg GSV that we investigated using ultrasonography. The study cohort included 501 patients (240 males and 361 females) who underwent EVLA for GSV. During the preoperative marking, we identified the point where SN and GSV first come into contact below the knee and defined this as the RO. We designated the inner malleolus as point A, the RO as point B, and the inner knee as point C. Three individuals performed SN identification with a 12MHz probe using Aplio and measured the positions of the aforementioned points during preoperative marking. Finally, the physician confirmed the final position using Aplio i700 with a 12MHz probe in the OR. There was no statistically significant difference in the length of RO between the right and left limbs (right: A 35.6 ± 2.4 B 27.3 ± 5.2 C 20.5 ± 5.2 , left: A 35.5 ± 2.4 B 26.7 ± 5.4 C 20.0 ± 5.2 ; cm).

RO was located below the knee in most cases; however, we observed RO above the knee in four cases (five limbs, 1%). In EVLA, we altered the ablation conditions relative to the proximal part of the RO to prevent neural injury, and observed one limb (0.2%) with neural injury after the procedure. Measuring RO may improve the safety of lower leg laser ablation.

EVF Prize 2023 Winner Presentation

IS-1-2 The Epidemiology And Risk Factors Of Chronic Venous Disease And Superficial Vein Reflux In A General Population In The Netherlands -- Results From The Rotterdam Study

Eveline Scheerders

Erasmus MC, Rotterdam, Netherlands

Background: Chronic venous disease (CVD) of the lower extremities is a common health problem, accountable for 1-2% of the total health care costs in European countries. There are multiple studies on the prevalence of superficial venous incompetence and chronic venous disease, varying widely in results.

Objective: The aim of this study was to investigate the prevalence of CVD and truncal reflux in a general population, and to assess possible risk factors.

Methods: This study is a cross sectional population-based study, embedded in the Rotterdam Study. Men and women aged at least 40 years in a Rotterdam district were invited to participate. Of each participant baseline demographics, clinical signs of chronic venous disease (CEAP classification) and duplex ultrasound outcomes regarding superficial venous reflux and post thrombotic damage were collected. Possible risk factors for having superficial venous reflux were analyzed by means of multivariable logistic regression analysis.

Results: A total of 2510 participants (1441 females; 1069 males) were examined, with an median age of 54.0 years. Using the highest clinical stage, 84.2% participants were classified C0-1, 12.8% C2, 2.3% C3 and 0.7% C4-6. In 23.2% (95%CI 21.6-25.0) of all participants, reflux was present in at least one superficial venous trunk (great saphenous vein and/or small saphenous vein). Female gender, age, height and a history of varicose vein treatments were associated with a higher prevalence of truncal reflux and chronic venous insufficiency (C3-6).

Conclusion: This study shows a prevalence of superficial truncal vein reflux of 23.2% and a prevalence of 3.0% of chronic venous disease in a general population in The Netherlands. Female gender, age, height and a history of varicose veins treatments are risk factors for having superficial truncal reflux and CVD.

IS-2-1 Genotype-phenotype analyses in patients with Klippel-Trenaunay syndrome using targeted next-generation sequencing for detection of PIK3CA mutations

Department of Plastic and Reconstructive Surgery, Faculty of Medicine and Graduate School of Medicine, Hokkaido University, Japan

Kosuke Ishikawa, Yuki Sasaki, Kanako C Hatanaka, Yumiko Oyamada, Yusuke Sakuhara, Tadashi Shimizu, Tatsuro Saito, Naoki Murao, Tomohiro Onodera, Takahiro Miura, Taku Maeda, Emi Funayama, Yutaka Hatanaka, PhD, Yuhei Yamamoto, and Satoru Sasaki

BACKGROUND: Klippel-Trenaunay syndrome (KTS) is a rare slow-flow combined vascular malformation with limb hypertrophy. KTS is thought to lie on the PIK3CA-related overgrowth spectrum, but reports are limited. We aimed to demonstrate the clinical utility of targeted next-generation sequencing (NGS) in identifying PIK3CA mosaicism in archival formalin-fixed paraffin-embedded (FFPE) tissues from patients with KTS.

METHODS: This retrospective study involved 14 patients with vascular malformations with lower limb hypertrophy who underwent resection of the vascular malformations between 2011 and 2020. KTS was diagnosed based upon the triad of capillary malformation, venous malformation, and hypertrophy of the affected limb. We used an order panel to perform targeted sequencing of all PIK3CA gene coding sequences. The panel consisted of 64 amplicons with an overall coverage of 87.9%.

RESULTS: Participants were 9 female and 5 male patients with KTS diagnosed as capillaro-venous malformation (CVM) or capillaro-lymphatico-venous malformation (CLVM). Median age at resection was 14 years (range, 5–57 years). Median archival period before DNA extraction from FFPE tissues was 5.4 years (range, 3–7 years). NGS-based sequencing of PIK3CA achieved an amplicon mean coverage of 119,000x. PIK3CA missense mutations were found in 12 of 14 patients (85.7%; 6/8 CVM and 6/6 CLVM), with 8 patients showing the hotspot variants E542K, E545K, H1047R, and H1047L. The non-hotspot PIK3CA variants C420R, Q546K, and Q546R were identified in 4 patients. Overall, the mean variant allele frequency for identified PIK3CA variants was 6.9% (range, 1.6%–17.4%). All patients with geographic capillary malformation, histopathological lymphatic malformation or macrodactyly of the foot had PIK3CA variants. No genotype-phenotype association between hotspot and non-hotspot PIK3CA variants was found.

DISCUSSION: Amplicon-based targeted NGS could identify low-level mosaicism from low-input DNA extracted from FFPE tissues, potentially providing a diagnostic option for personalized medicine with inhibitors of the PI3K/AKT/ mTOR signaling pathway.

IS-2-2 Anatomy of the Superficial Collecting Lymph Vessels: Lymphosome Revised

Department of Plastic and Reconstructive Surgery, National Center for Global Health and Medicine, Tokyo, Japan

Hayahito Sakai, Toko Miyazaki, Maya Kanasaki, Reiko Tsukuura, Takumi Yamamoto

Background: Although manual lymphatic drainage and lymphatic surgery are developed and performed based on lymphatic anatomy, some descriptions in textbooks are reported incorrect. The aim of this study was to reveal the real in-vivo superficial lymph flows.

Methods: Indocyanine green (ICG) lymphography findings on non-lymphedematous limbs were reviewed. To visualize all superficial lymph flows, ICG was subdermally injected at multiple sites; lateral midline for lower extremity; tip of the coccygeal bone (H1), center of the gluteal fold (H3), and midpoint between H1 and H3 (H2) for hip; in the mid-lateral upper arm, at the levels of one (U1), two (U2), and three (U3) quarters from the lateral edge of the acromion to the lateral epicondyle for upper extremity; in the midline of the back, at every 3cm from 3cm cranial to the seventh cervical spinous process (C7) to the level of the axillary crease (B1–6/8). Directions of the superficial lymph flows on ICG lymphography were evaluated.

Results: 17 lower extremities and hips, 30 upper extremities, and 19 backs were included. Lower extremity ICG lymphography showed anteromedial pathways to the inguinal lymph nodes in 10 cases, and posteromedial pathways in 11 cases. Hip ICG lymphography showed anteromedial pathways from H1/2/3 to the inguinal lymph nodes in 13/12/3, and posteromedial pathways in 0/10/12, respectively. Upper extremity ICG lymphography showed anteromedial pathways from U1/2/3 to the axial lymph node in 27/24/6 upper extremities, and posteromedial pathways in 4/19/28, respectively. Back ICG lymphography showed pathways to the supraclavicular lymph nodes in 18, and those to the axillary lymph nodes in 19.

Conclusions: This study revealed several points where bidirectional lymph flows were visualized on ICG lymphography, representing the real watershed of lymphosomes different from textbook descriptions. Lymphedema treatments should be performed based on the real anatomy.

IS-2-3 A Study of optimal pressure for compression therapy of Klippel-Trenaunay syndrome

Vascular Surgery, Aichi Medical University, Japan
Hiroki Mitsuoka, Takashi Ohta, Akio Kodama,
Yuki Orimoto, Yuki Maruyama, Takahiro Arima

[BACKGROUND] Klippel-Trenaunay syndrome (KTS) is associated with complex venous and lymphatic reflux disorders, resulting in varicose veins and lymphedema of the lower extremities. The basic treatment is compression therapy using elastic stockings. However, the optimal compression pressure for compression therapy of the KTS limb is not clear. To investigate the effect of different compression pressures of elastic stockings on venous return, we performed Air plethysmography (APG) with elastic stockings.

[METHODS] Patients diagnosed with KTS between January 2016 and December 2023 and who performed APG wearing 20 mmHg and 30 mmHg high sock-type elastic stockings on the affected limb were included. APG was performed in the following order: without elastic stockings, with 20 mmHg elastic stockings, and with 30 mmHg elastic stockings. Venous volume (VV), venous filling index (VFI), ejection fraction (EF), Residual Volume Fraction (RVF) were statistically examined.

[RESULTS] Twenty patients (14 males and 6 females) were measured, median age 32 years (13-59), and all affected limbs were unilateral. The median APG results when not wearing elastic stockings, 20 mmHg, and 30 mmHg were VV (241.8 ml, 177.9 ml, 189.0 ml), VFI (4.3 ml/sec, 2.9 ml/sec, 2.9 ml/sec), EF (39.5%, 42.6%, 42.2%), RVF (45.9%, 49.4%, 52.0%); VV and VFI were significantly different ($p < 0.001$) between not worn and 20 mmHg and between worn and 30 mmHg.

[DISCUSSION]

Wearing elastic stockings significantly decreased VV and VFI, and EF showed a trend toward improvement. However, RVF tended to worsen, although not significantly, suggesting that the hemodynamics of deep veins may be different in KTS patients, and that wearing elastic stockings may impair venous return and worsen RVF in patients whose venous return is mainly to superficial veins. Wearing 20 mmHg elastic stockings on the KTS limb improved VV and VFI, but wearing 30 mmHg elastic stockings did not improve them further.

IS-3-1 Comparison of endovenous surgeries for incompetent great saphenous veins using clinical scores

Kamagaya General Hospital/ Department of cardiovascular surgery, Japan

Yohei Kawatani, Takaki Hori

[Background] It is crucial that the safety and efficacy of endovenous procedures for saphenous vein incompetence are thoroughly evaluated at the point of care utilizing objective scores and findings and consider the patient's background.

[Methods] All endovenous procedures performed between August 2020 and July 2022 were included. Patients were followed for 12 months. Ultrasound examinations were conducted at post-operation clinic visits. C classification, VDS, and rVCSS were assessed pre-operatively and 12 months post-operatively. In cyanoacrylate closure (CAC) procedures, phlebectomy was not performed concurrently due to the non-tumescent nature of the technique.

[Results] A total of 154 cases were included. Endovenous thermal ablation (ETA) was performed in 69 cases, while CAC was performed in 95 cases. The CAC group was older than the ETA group (75 ± 11 vs 68 ± 14 years, $p=0.005$). No patient died during the observational period. No cases of EHIT/EGIT class 3-4, deep venous thrombosis, recurrence of the incompetence in the treated vein, stroke, or pulmonary embolism were reported. One hypersensitivity reaction and 3 cases of phlebitis occurred in the CAC group. Although there were no preoperative differences, the C classification and rVCSS were lower in the ETA group than in the CAC group at the 12-month postoperative evaluation (C classification: 0.92 ± 0.02 vs 1.51 ± 1.4 , $p=0.054$; rVCSS: 1.0 ± 1.2 vs 2.3 ± 2.6 , $p=0.013$). The reductions in C classification and rVCSS were greater in the ETA group than in the CAC group (C classification: 0.92 ± 0.02 vs 1.51 ± 1.4 , $p=0.054$; rVCSS: 1.0 ± 1.2 vs 2.3 ± 2.6 , $p=0.013$).

[Discussion] Both operative methods are equally safe and effective as previously reported 1)2), which is not consistent with a recently published warning report3). However, ETA was superior to CAC based on C classification and rVCSS. This superiority is assumed to be due to the absence of phlebectomy in CAC.

IS-3-2 The Utility of Duplex Ultrasound Waveforms to Detect Iliac Venous Obstruction

Department of Vascular Surgery, Straub Medical Center at Hawai'i Pacific Health, United States

Aoi Ogawa, Elna Masuda

BACKGROUND

Iliac vein obstruction (IVO) is recognized as an important cause of chronic venous insufficiency and can be contributed to non-thrombotic venous lesions (NIVL) or post-thrombotic syndrome (PTS). Although the pathologic abnormalities between the two are clearly different, the clinical manifestations can be identical(1). Duplex ultrasound is a commonly used initial test for IVO due to the accessibility and the loss of respiratory variation in the femoral vein is traditionally used to detect ilio caval obstruction(2,3). This project aims to determine the utility of duplex ultrasound femoral venous phasicity in detecting IVO.

METHODS

Patients with clinically suspected IVO who underwent both duplex ultrasound and intravascular ultrasound (IVUS) were included. The IVUS criteria for significant IVO of $\geq 50\%$ was compared to presence or absence of respiratory variation when examining the femoral veins by duplex scan.

RESULTS

A total of 44 limbs (NIVL: 38 limbs, PTS: 6 limbs) were included and 29 limbs had $\geq 50\%$ stenosis by IVUS. The lack of phasicity detecting $\geq 50\%$ stenosis showed sensitivity of 27.6%, specificity of 86.7%, PPV of 80.0%, and NPV of 38.2%. For those with NIVL, sensitivity was 16.7%, specificity was 85.7%, PPV was 66.7%, and NPV was 37.5% for detecting $\geq 50\%$ stenosis.

DISCUSSION

For patient clinically suspected to have IVO, the duplex finding of loss of respiratory phasicity showed a low sensitivity but high specificity in detecting $\geq 50\%$ stenosis. The low sensitivity was especially notable in those with NIVL. This could be explained by NIVL being focal that upstream obstruction cannot be detected by downstream femoral vein test. In the setting of high clinical suspicion, the lack of respiratory phasicity should not be used as a sole test to rule out IVO and other imaging modalities may be needed.

IS-4-1 Appropriateness for Chronic Venous Disease procedures

Sergio Giancesini

University of Ferrara, Italy / Uniformed Services University of Health Sciences, Bethesda, USA

Even recently published international guidelines on lower limb Chronic Venous Disease (CVD) procedures keep on showing similarities and controversies among documents delivered by different organizations. In line with what already reported in v-WINter 2019 Congress and v-WINter 2022 Congress documents on the related topic, methodological flaws and biases, together with different socio-economic contexts can be involved in this phenomenon. Moreover, the RCT- DUPLICATE initiative has demonstrated the lack of overlapping between randomized comparative trials and real world data generation. This last aspect becomes of paramount importance considering USA, UK and European regulatory bodies have clearly stated the pivotal role of real world evidence in health policies determination. Conducting proper investigations is equally mandatory before the market release of a product and after: indeed, post-market surveillance has been showcasing the need of appropriate monitoring in order to avoid even severe complications in more than 40% of the notified files. The current technology and software implementation facilitate the exponential growth of data collection, yet appropriate methodology must be used to limit the bias and maximize the reliability of the acquired data, while avoiding time-consuming processes. The herein presented work reviews the appropriate approach toward chronic venous disease, focusing on outcome measures not related just to the reflux suppression and on the methodology used to assess and report the same outcomes, with the final aim to optimize the vein-lymphatic patient care in a real world setting. In this scenario, an innovative digital platform called “v-Registry” and designed to collect de-identified aggregated real world data from all around the world is described and analyzed in its search, abolishing commonly involved biases in venous disease procedures performance assessment.

【Curriculum Vitae】

Dr. Sergio Giancesini is an associate professor of cardiovascular surgery at the University of Ferrara, Italy, where he focuses on vein and lymphatic research and practice. He is involved in the School of Medicine, Vascular Surgery Residency program, Physiotherapy courses, and the School of Dentistry. Additionally, he serves as an adjunct associate professor at the Uniformed Services University of Health Sciences in the USA. Dr. Giancesini holds a PhD in Vascular System Molecular Patho-physiology and contributes to the Advanced Therapies & Experimental Pharmacology PhD course. He is an invited professor at the University of Padova and Albania University. He is the editor-in-chief of Vascular Insights and serves on various editorial boards. He has published over 80 scientific papers and delivered more than 380 lectures globally. He co-founded the v-WIN foundation and served as UIP vice-president from 2018 to 2022, President-Elect from 2022 to 2023 and will serve as the UIP President from 2023 to 2027

IS-4-2 Revised Venous Clinical Severity Score: Visual Language and Clinical

Michael A. Vasquez
 Venous Institute of Buffalo

Revised Venous Clinical Severity Score: rVCSS 静脈疾患臨床重症度スコア(2010改訂版)

	なし:0	軽度:1	中等度:2	重度:3
痛み、あるいは不快感(急な痛み、持続的な痛み、こり、うずき、張り感、筋肉痛、重さ、だるさ、疲労感、ひりひり感、灼熱感、を含む)。静脈疾患が原因と推定できる。		時々(日常生活に支障がない)	常時(やや日常生活の支障になるが、著しい妨げにはならない)	常時(日常生活を著しく妨げる)
静脈瘤 “瘤”は立位で直径 ≥ 3 mmのもの。		少数:散在性(孤立性の分枝静脈瘤あるいは集塊状の静脈瘤)冠状静脈拡張症(アングルフレア)*も含める	下腿、あるいは大腿のどちらかに限局	下腿と大腿の両方に存在
静脈性浮腫 静脈疾患が原因と推定できる。		足部と足首に限局	足首よりも頭側まで及ぶが膝下に限局	膝あるいは膝上まで及ぶ
皮膚の色素沈着 静脈疾患が原因と推定できる。静脈瘤の部位に限局した、あるいは他疾患に起因する色素沈着は除外する。	なし、あるいは巣状	内果・外果の周囲に限局	下腿遠位1/3に広がる	下腿遠位1/3を超えて頭側まで分布
炎症 単に最近生じた色素沈着を指すのではなく、炎症(紅斑、感染・蜂巣炎、うっ滞性湿疹、皮膚炎)を伴うもの。		内果・外果の周囲に限局	下腿遠位1/3に広がる	下腿遠位1/3を超えて頭側まで分布
皮膚硬化 静脈疾患が原因と推定できる二次的な皮膚および皮下の変化(線維化を伴う慢性浮腫、萎縮性皮膚炎)。白色萎縮と脂肪皮膚硬化症を含める。		内果・外果の周囲に限局	下腿遠位1/3に広がる	下腿遠位1/3を超えて頭側まで分布
活動性潰瘍の数	0	1	2	≥ 3
活動性潰瘍の罹患期間(最も長期のもの)	N/A	<3ヶ月	3-12ヶ月	1年以上治癒せず
活動性潰瘍の大きさ(最も大きいもの)	N/A	直径<2 cm	直径2-6 cm	直径>6 cm
圧迫療法の使用	不使用	弾性ストッキングを時々使用	たいていの日は弾性ストッキングを使用する	弾性ストッキングを毎日指示どおりに使用

*足首や足部の内側あるいは外側にみられる、5個より多くの青色クモの巣状血管拡張の集簇

【Curriculum Vitae】

The Venous Institute of Buffalo is devoted to promoting vein health. Michael A. Vasquez MD, RVT, is a diplomate of the American Board of Surgery and the American Board of Venous & Lymphatic Medicine. He is nationally and internationally recognized for his expertise, teaching and research in outcomes following treatment of venous reflux disease. He specializes in chronic venous insufficiency treatments including the VenaSeal procedure, endothermal radiofrequency ablation using the ClosureFast catheter, Varithena polidocanol microfoam chemical ablation, ultrasound-guided foam sclerotherapy and microphlebectomy.

IS-4-3 Sclerotherapy of stages C2 and above: from recommendations to good practice.

Matthieu Josnin

French Society of Phlebology, France

Sclerotherapy is the most widely used non-thermal non-tumescent treatment in the world. In the recent years, thanks to the introduction of ultrasound guided sclerotherapy and the diffusion of the foam form, it has been extended to numerous indications in the treatment of varicose veins.

The aim of sclerotherapy is to damage the venous endothelium by injecting a sclerosing agent, resulting in fibrosis of the vein.

Recent publications of European (2022) and North American (2023) guidelines have shown the importance and place of this technique and repositioned it in relation to other techniques.

Despite this, a number of prerequisites still need to be met, the key word being standardisation, an issue we will return to throughout this presentation. Compliance with contraindications and local regulations is essential.

We will look at the use of sclerotherapy in the treatment of varicose ulcers.

We will look at practical examples.

It should always be kept in mind, however, that the saphenous trunks account for no more than a third of varicose veins, and that this gives sclerotherapy its full legitimacy.

【Curriculum Vitae】

Dr Matthieu Josnin is a specialist in vascular medicine. He is the founder and head of an interventional phlebology centre. The clinic is also a university-accredited training centre for residents and post-graduate training. Dr Matthieu Josnin is immediate past president and vice-president of the French Society of Phlebology and an associate member of the French National Academy of Surgery. He remains very active in teaching, particularly as part of the University Degree in Phlebology and Endovenous Techniques at Paris Sorbonne University. He is also actively involved in continuing medical and nursing education, and is involved in studies and publications. He is a member of the Education Committee of the International Union of Phlebology. Honorary member of the Canadian Society of Phlebology. He is a member of the American Venous and Lymphatic Society, the American Venous Forum and the European Venous Forum. He is an associate member of the French College of Teachers of Vascular Medicine.

IS-4-4 Venous & Lymphatic Disease: My 30 years Experiences (1994 ~ 2024)

Dong-ik Kim

Div. of Vascular Surgery, Sungkyunkwan Univ., Samsung Medical Center, Seoul, Korea

My History of Venous and Lymphatic Surgery

- Varicose vein surgery: (1) Conventional surgery (HL, Stripping, VS) (2) Valvuloplasty (External Banding Technique) (3) Transilluminated Powered Phlebectomy (4) EVLA (5) RFA (6) Sclerotherapy
- Lymphatic surgery: 1) Lymphovenous anastomosis 2) Homan's surgery
- Iliac vein thrombosis (Palma operation)
- CVM (congenital venous malformation)
- Renal vein transposition on Nutcracker syndrome

Articles related with Varicose vein (DI Kim)

- 1st & corresponding author: 8 Corresponding authors : 3

Articles related with Lymphedema (DI Kim)

- 1st & corresponding author: 3 Corresponding authors : 6

Articles related with miscellaneous disease (DI Kim)

- 1st & corresponding author : 2 Corresponding authors : 3

Articles related with CVM (DI Kim)

- 1st & corresponding author: 5 Corresponding authors : 22

【Curriculum Vitae】

Current Status

- 1) Professor, Division of Vascular Surgery, Samsung Medical Center, Sungkyunkwan University
- 2) Fellow, National Academy of Medicine of Korea
- 3) (Past) Vice President, Union of International Phlebology (2018-2023)
- 4) (Past) President, Asian Venous Forum (2012-2015)
- 5) Congress President, 2015 Seoul UIP (2015)
- 6) (Past) President, Korean Society for Phlebology (2011-2013)
- 7) (Past) President, Korean Society for Vascular Surgery (2016-2018)
- 8) (Past) President, Korean Society for Stem Cell Research (2018-2020)

Education

Mar.1978 - Feb.1984 : College of Medicine, Hanyang University, Seoul, Korea (M.D.)

Mar.1992 - Jul.1995 : Graduate School, Hanyang University, Seoul, Korea (Ph.D.)

Societies and Memberships

Fellow, American College of Surgeons

Member, Society for Vascular Surgery

Member, European Society for Vascular Surgery

Member, International Union of Angiology

Member, International Society of Lymphology

Member, International Society for the Study of Vascular Anomalies

Articles

1. Published articles in International Journal : 190 papers
2. Published articles in Domestic Journal : 100 papers

IS-4-5 Clinical Experience of Recurrent Deep Vein Thrombosis (DVT) after Endovascular Treatment (EVT) for first Venous Thromboembolism Event

Sun Choel Park, Jang Yong Kim

Division of Transplant and Vascular Surgery, Department of Surgery, Seoul St. Mary's Hospital, The Catholic University of Korea

Background: Recurrent DVT(RDVT) after EVT is not uncommon. Recurrent DVT after EVT are caused by patient' comorbidities, EVT techniques and medication. This paper reviews our experience in Recurrent DVT after Endovascular treatment for DVT.

Methods: This is retrospective study of patients, who had recurrent DVT after EVT for DVT in St. Mary Hospital from 2018 to 2023. We reviewed clinical characteristics and treatment's results and evaluated technical success and overall mortality.

Results: Of the 134 EVTs for DVT, 26(19.4%) had RDVT. A single event was more frequent in left lower limb DVT ($p=0.01$), while RDVT cases had more bilateral DVT ($p=0.01$). E-Luminexx, Wall stent, Venovo stent were used. There was the 1st recurrence (11), 2nd recurrence (7) and 3rd recurrence (1). DVT recurred in right (5)/ left (16)/ both (5) and recurred in ipsilateral leg(21)/ contralateral or IVC(5). Technical failure was found in 22 cases (84.6%); table 1) Poor compliance or hypercoagulability in 3 cases. In addition, obesity, abnormal coagulation, and prior history of PE and bilateral DVT were found to be independent predictors of RDVT.

Conclusions: RDVT can happen and are frequently associated with technical problem. These findings should help identifying high-risk patients and set effective preventive measures for RDVT that may revise the duration of anticoagulation.

Key words: DVT, PE, deep vein thrombosis, Endovascular procedure

Table 1) Causes of Recurrent DVT

Categories	N=26		
Procedure related	22	Insufficient coverage to proximal iliac artery	7
		Stent malposition to IVC	1
		Small diameter stent	3
		Inflow femoral vein related	2
		Stent migration	2
		External compression (cancer, week radial force stent)	4
		Residual filter	3
Poor compliance	2		
Hypercoagulability	2		

【Curriculum Vitae】

Academic Qualifications:

M. D.; 1996(학)838 Feb/1997 College of Medicine, The Catholic University of Korea

Master of Medical Science;

2002(학)087 Feb/2003 Graduate School, College of Medicine, The Catholic University of Korea

Doctor of Philosophy in Medical Science/General Surgery, Ph.D.;

2008(학)046 Feb/2009 Graduate School, College of Medicine, The Catholic University of Korea

Training and Current and Previous Relevant Positions:

Mar. 2018 ~ present Professor, Seoul St. Mary's Hospital, The Catholic Univ. of Korea.

Mar. 2021 ~ present director of the organ transplantation center, Seoul St. Mary's Hospital.

Sep. 2023 ~ present chief of the surgery, Dept. of Surgery, Seoul St. Mary's Hospital.

Nov. 2023 ~ present Chairman of the Board of Directors, The Korean Society of Phlebology.

License / ID Number:

Mar. 1997: Korean Medical License (M.D): 60278

Mar. 2002: Korean Board Certificate of General Surgery: 4901

Dec. 2015: Korean Board Certificate of Vascular Surgery: 043

2011: RVT (Registered Vascular Technologist),

RPVI (Registered Physician in Vascular Interpretation): 151111

In Korea Membership

Membership of Korean Surgical Society

Membership of Korean Society for Vascular Surgery

Membership of Korean Society for Transplantation

Membership of The Korean Society of Phlebology

Membership of The Korean Society for Hemodialysis Access

ARDMS member (151111) - American Registry for Diagnostic Medical Sonography

TTS member - The Transplantation Society

IS-PI-1 Relationship between sarcopenia and edema in patients undergoing endovascular treatment for primary varicose veins.

Vascular Surgery, Aichi Medical University, Japan

Hiroki Mitsuoka, Akio Kodama, Yuki Orimoto, Yuki Maruyama, Takahiro Arima, Miki Shima

[BACKGROUND]

The incidence of primary varicose veins increases with age, and with age-related decline in physical function (sarcopenia [SP]), leg edema is frequently observed in elderly patients. Endovascular treatment for primary varicose veins is minimally invasive and is performed in the elderly, but the degree of frailty in patients who have undergone surgery is unknown. InBody can evaluate SP and edema at the same time. We investigated the relationship between SP and edema in patients undergoing endovascular treatment for primary varicose veins using InBody.

[METHODS]

Patients who underwent laser ablation for primary varicose veins between July 2023 and January 2024 and had preoperative InBody measurements were included. The evaluation items were skeletal muscle mass index (SMI) and extracellular water to total body water ratio (ECW/TBW). SMI less than 7.0 in men and 5.7 in women were defined as having SP, and ECW/TBW greater than 0.39 was defined as having edema. In cases where InBody was measured again between 2 and 4 weeks postoperatively, the relationship between pre- and postoperative ECW/TBW and preoperative SMI was statistically evaluated.

[RESULTS]

The median age was 69 (31-84) years for males and 72 (52-87) years for females. 2 males (9.5%) had a SMI of less than 7.0 and 12 females (48.0%) had a SMI of less than 5.7. Preoperative ECW/TBW was greater than 0.39 in 25 males (73.5%) and 36 females (90.0%). Preoperative ECW/TBW was 0.399 in the SP group and 0.394 in the non-SP group, and was significantly greater in the SP group ($p < 0.001$). Postoperatively, InBody was measured in 33 patients with 54 limbs (15 males with 26 limbs and 18 females with 28 limbs). Postoperative ECW/TBW was 0.401 in the SP group and 0.393 in the non-SP group, and was significantly greater in the SP group ($p < 0.001$). Pre- and postoperative ECW/TBW improved significantly in males ($p = 0.044$) but not in females ($p = 0.154$).

[DISCUSSION]

ECW/TBW improved significantly in men after surgery, but there was no significant difference in women. SP was observed more frequently in women, and SP may have prevented the improvement of postoperative edema (ECW/TBW).

IS-PI-2 Comparison of Chronic Effects between Balloon Dilation Alone and Additional Stenting for Acute Deep Vein Thrombosis with Iliac Vein Compression Lesion

Division of Pulmonary Circulation, Department of Cardiovascular Medicine, National Cerebral & Cardiovascular Centre, Suita, Osaka, Japan

Hiroya Hayashi, Akihiro Tsuji, Shinya Fujisaki, Ryo Takano, Mitsumasa Akao, Hiroyuki Endo, Naruhiro Nishi, Takatoyo Kiko, Ryotaro Asano, Jin Ueda, Takeshi Ogo

BACKGROUND: Catheter intervention for acute proximal deep vein thrombosis (DVT) is an invasive therapeutic option for the prevention of post thrombotic syndrome (PTS). However, the efficacy of balloon dilatation alone and additional stenting for acute proximal DVT complicated with iliac vein compression lesion (ICL), has not been fully investigated.

METHODS: We performed catheter interventions for 202 patients with DVT from 2014 to 2021. The efficacy of treatment was assessed by the incidence of PTS with the Villalta scale and ICL patency after two years. The ICL patency was defined by the presence of venous flow by venous echography.

RESULTS: Thirty-six patients with ICL were treated with balloon dilation or additional stenting in addition to catheter directed thrombolysis/thrombus aspiration in acute phase. Twenty-seven patients were enrolled in this study, excluding nine patients with missing the chronic phase data. The study patients were divided into two groups: patients with balloon dilation alone group ($n = 19$) and additional stenting group ($n = 8$). There were no significant differences in the Villalta scale at baseline (11.2 ± 3.9 vs 10.9 ± 4.7 ; $p = 0.95$). After two years, there were no significant differences between the two groups in the Villalta scale (1.5 (0.8-2.3) vs 0 (0-1.3), $p = 0.13$) and the ICL patency rates (62.5% vs 100% , $p = 0.08$). The incidence of the PTS was 6.3% in the balloon dilation alone group and 0% in the additional stenting group ($p = 0.53$).

DISCUSSION: Although the additional stenting group tended to be effective for prevention of PTS in chronic phase than the treated with balloon dilation alone group, there was no significant statistical difference between these groups. On the other hand, the incidence of PTS was extremely low in both groups during the chronic phase. Therefore, it is necessary to carefully consider which patients would benefit from additional stenting.

IS-P1-3 Clinical manifestations of varicose veins associated with the insufficiency of lateral sural cutaneous nerve veins

Yamamoto Vein Clinic
Takashi Yamamoto

BACKGROUND: A certain amounts of varicose veins (VVs) over the popliteal fossa arise from perforators unrelated to small saphenous vein (SSV). Most of those perforators are connected to accompanying veins of sciatic nerve, common peroneal nerve and caudally lateral sural cutaneous nerve. However, the detailed information of nerve-related varicose veins is lacking.

OBJECTIVE: To describe the prevalence, clinical symptoms, and backgrounds of VVs related to the accompanying vein of lateral sural cutaneous nerve (LSCNV).

METHODS: Information on 4,166 patients (8,332 limbs) attending for outpatient consultation are retrospectively reviewed. The incompetence of LSCNV was defined as a reflux more than 0.5 sec, 3 mm in diameter, and 5 cm in length. The limbs with LSCNV incompetence were classified in two groups, group A, without previous treatment on SSV, and group B, received previous treatment on SSV. Frequency of occurrence, age, sex, right and left, origin, and VCSS scores were compared between the two groups.

RESULTS: The numerical value of the groups were described as follows “total (group A : group B)”. LSCNV incompetence was identified on 53 (42 : 11) limbs (0.64%). The average age was 59.1 ± 14.6 (56.0 ± 15.7 ; 69.9 ± 13.7). Female sex account for 50 (41 : 9) (94.3% (97.6% : 81.8%)). Right limbs occupied 30 (24 : 6) (56.6% (57.1% : 54.5%)). Origins were defined according to the identified origin of the incompetence, high, along the sciatic nerve and common peroneal nerve, low, direct perforator from popliteal vein. High origin were observed 27 (25 : 2) (50.3% (59.5% : 18.2%)). Average VCSS score was 5.26 ± 3.40 (5.31 ± 3.14 : 5.09 ± 4.43).

CONCLUSION: LSCNV incompetence was identified on 0.64% of the patients, most of them were female and their origins were tend to high on group A ,and low on group B.

IS-P1-4 Development of a novel analysis method for lower extremity varicose veins using photoacoustic imaging

Department of Radiology, Keio University School of Medicine, Japan

Moemi Urano, Kenichi Nagae, Sachiko Matsuda, Kentaro Matsubara, Nobuaki Imanishi, Hideaki Obara, Masahiro Jinzaki, Sadakazu Aiso

Background: Photoacoustic imaging devices are expected as diagnostic imaging tools that can visualize blood vessels non-invasively. Although patient interviews, palpation, and echography are commonly employed in the diagnosis of varicose veins in the lower extremities, these methods are susceptible to the influence of the practitioner’s skill and subjectivity. Consequently, there is a pressing need for the establishment of objective evaluation criteria. In this study, we aimed to visualize and quantitatively assess the vascular morphology of lower extremity varicose veins using a high-resolution, non-invasive photoacoustic imaging system.

Methods: Seven patients with lower extremity varicose veins were included in the study. In addition to conventional interviews, visual inspection, palpation, and echography, the lower extremities were photographed using a photoacoustic imaging system. The blood presence density in areas diagnosed with varicose veins and non-varicose regions was calculated from the captured images. The blood presence density was defined as the amount of blood vessels per unit area exceeding a specific brightness.

Results: Images of the lower limbs obtained with the photoacoustic imaging system were able to depict the details in three dimensions, including fine blood vessels. The regions identified with varicose veins exhibited a markedly intricate vascular morphology compared to other areas. Furthermore, upon calculating the blood presence density, it was discernible that the regions diagnosed with varicose veins possessed a significantly elevated vascular density relative to the surrounding tissue.

Discussion: Visualizing blood vessels with the photoacoustic imaging system enabled detailed three-dimensional observation of the vascular morphology of lower extremity varicose veins. In addition to morphological observation of vessels, numerical evaluation is also expected. This study demonstrated the potential for more accurate assistance in the visual diagnosis of lower extremity varicose veins.

IS-P1-5 Experience with Endovenous Laser Ablation for Lower Limb Varicose Veins Using an Automatic Ablation System

Kochi Vein Care Clinic, Japan

Katsushi Oda

Background: Endovenous laser ablation (EVLA) using manual traction is a common technique for treating lower limb varicose veins. However, it has drawbacks such as the need for skill acquisition and increased operator burden for multiple or lengthy ablation procedures. To solve such problems, we have been performing EVLA with an automatic ablation program (AEVLA). This study aimed to report the early outcomes of AEVLA.

Methods: From May 2023, AEVLA using the Venolaser 1470 system (Unitac, Japan) was performed in 435 cases (513 great saphenous veins [GSV] and 198 small saphenous veins [SSV]), while the control group (C) included 496 cases treated with manual traction EVLA from October 2022 to May 2023 (690 GSV and 192 SSV). The AEVLA utilized a 1470 nm laser and a traction device. Input parameters included the length of ablation from the puncture site to the risk point where the GSV meets the adjacent nerve, as well as the desirable central intense ablation length. A continuous ablation was carried out based on predetermined conditions, and ablation was terminated upon reaching the planned ablation length. Concurrent tumescent local anesthesia (TLA) was performed during ablation. The GSV treatment speed, represented as the treatment length divided by the treatment time (L/T), was compared between the two groups.

Results: Comparisons between group A and C yielded the following mean±SD values. Treatment length (cm): GSV 50.2±17.2 vs. 54.2±15.6, SSV 12.9±4.1 vs. 14.3±4.7; Treatment time (minutes): GSV 16.0±6.0 vs. 15.5±5.4, SSV 7.4±2.2 vs. 6.8±5.4; The L/T ratio was significantly different between the two groups (0.37±0.07 vs. 0.32±0.04, p<0.05).

Conclusion: AEVLA has the potential to offer consistent treatment outcomes with reduced operator variability. It also demonstrates the potential for shortened treatment time. AEVLA may improve treatment efficacy and efficiency.

IS-P2-1 Efficacy of using a vessel dilator during surgery to evaluate vein diameter and predict radiocephalic arteriovenous fistula maturation and patency

Department of Cardiovascular Surgery, Higashiosaka City Medical Center, Higashiosaka, Osaka, Japan

Kanako Takai, Takehisa Nojima, Nobuyuki Takai, Hidehiko Taguchi, Kosei Hasegawa, Takashi Yamauchi

Background: We routinely use vessel dilators to assess the diameter of the target vein during surgery for arteriovenous fistula (AVF) creation in hemodialysis patients. This study investigates the efficacy of using vein diameter as measured using vessel dilators versus that as measured on preoperative ultrasonography to predict postoperative complications and patency.

Methods: Sixty-three patients who underwent creation of a radiocephalic arteriovenous fistula and had measurements of preoperative ultrasonographic vein diameter (UD) and vein diameter during surgery (SD) were retrospectively analyzed. Optimal cutoff values for UD and SD regarding complications were determined using receiver operating characteristic curve analysis and used to dichotomize the patients into high and low groups for comparisons. Patency was evaluated using the Kaplan-Meier method.

Results: The 2-year primary and secondary patency rates overall were 66.5% and 88.9%, respectively. The optimal UD and SD cutoff values were 2.4 and 3.5 mm, respectively. The 2-year primary patency rate was higher in the high SD group than the low SD group (88.2% vs. 58.6%; $P = 0.0426$). The 2-year secondary patency rate was significantly higher in the high UD/high SD group than the low UD/low SD group (91.7% vs. 68.4%; $P = 0.0067$).

Conclusion: Intraoperative measurement of vein diameter using vessel dilators when performing AVF surgery might be a useful method of predicting postoperative patency, particularly when SD is used in combination with UD.

IS-P2-2 Adverse Reactions to Endovascular Treatment for Varicose Veins - Thermal Ablation (TA) versus Nonthermal Ablation (NTA) with Cyanoacrylate

Kannai medical clinic, Japan

Mitsumi Yamashita, Masayuki Sou, Satoshi Itoh, Takaya Murayama

Background: Adverse reactions to Endovascular Treatment for Varicose Veins are known. There have been reports of refractory cutaneous and systemic symptoms. However, its pathogenesis is not fully understood. We compared the postoperative adverse reactions of TA with radiofrequency and laser and those of NTA with Cyanoacrylate.

Methods: A total of 98 cases of TA and 97 cases of NTA for incompetent large and small saphenous veins were performed in our clinic between June and December 2023 and August 2021 and August 2023, respectively. We retrospectively analyzed medical records to examine skin symptoms, frequency of occurrence, and timing of occurrence. Skin symptoms were classified into three categories: mild (symptoms localized to the treated area), moderate (symptoms beyond the treated area), and severe (symptoms not relieved by medical treatment and requiring surgical excision).

Results: The incidence of cutaneous adverse reactions was 20.4% for TA (mild 9.2%, moderate 11.2%, severe 0%) and 20.6% for NTA (mild 18.6%, moderate 1.0%, severe 1.0%). No severe systemic symptoms were observed. The time of onset was 82.1% within one week, 14.3% within one month, 3.6% within two months for TA, 32.0% within one week, 66.4% within one month, and 15.6% within two months for NTA. Numbness was present in 5 patients with TA and in 0 patients with NTA.

Discussion: The incidence of cutaneous adverse reactions was 20% for both TA and NTA. However, NTA was observed later, with a higher proportion of mild cases than TA. Foreign body granulomas are a feature of NTA. The adverse reactions of both types were predicted to have different underlying factors. Postoperative neuropathy was absent in NTA. NTA appears to be a useful treatment, especially for leg lesions with potential for neuropathy.

IS-P2-3 Early results of a retrospective study on cyanoacrylate closure for incompetent saphenous veins

Osaka Vein Clinic, Japan
Xiaoning Tong

Background

Cyanoacrylate closure(CAC) for saphenous veins is a relatively new modality, which was introduced to Japan as a treatment covered by national health insurance in 2019. We report early clinical results and patient satisfaction outcomes after intervention.

Methods

200 patients with incompetent saphenous veins were underwent CAC between January 2022 and July 2023. Post-procedure evaluations included Numerical Rating Score, patient satisfaction, time to return to work, revised Venous Clinical Severity Scores(rVCSS) and HSR.

Results

There were 64 male and 136 female patients. HSR was found in 19 of 236(8.1%) limbs, which occurred 8.2 ± 0.7 days after CAC. Patients' tracking rate was 100%, and mean tracking period was 91 ± 12 days.

Discussion

CAC is an effective way to block refluxing saphenous veins at early follow-up. Patients are highly satisfied and report low postoperative pain, and thermal-associated complication was avoided. Early results are encouraging, but we await further prospective long-term follow-up from the study.

IS-P2-4 The outcomes of radiofrequency ablation for varicose veins in terms of postoperative complications

¹Department of Cardiovascular Surgery, Ako Central Hospital, Ako, Japan

²Department of Cardiovascular Surgery, Hakuohkai Central Hospital, Amagasaki, Japan

Atsushi Kitagawa^{1,2}, Yukio Yamada¹, Toshihiko Nagao¹

Background: To elucidate the outcomes of radiofrequency ablation (RFA) for varicose veins of lower extremities, in terms of postoperative complications.

Methods: A two-center prospective RFA trial enrolled 580 legs in 484 patients with varicose veins (mean age 68 years, 372 legs in female) from 2014-2023. There were 461 legs of GSV, 125 of small SSV and 12 of ASV. According to the CEAP classification, there were 299 legs (52%) of C2, 168 (29%) of C3, 90 (15%) of C4, 23 (4%) of C5/6. The Closure-FAST catheter (Medtronic-Covidien) was used for RFA treatment. Outcome analyses included 1) the perioperative symptoms (day 1, 7, 30, 90): pain (P: scale 0-10), tenderness (T: scale 0-10) and ecchymosis (E: scale 0-5) based on RECOVERY study. 2) the other adverse events (DVT, PTE, allergic reaction, thrombophlebitis and sensory nerve disturbance) and 3) EHIT (endovenous heat-induced thrombosis) related to GSV cases using the postoperative duplex scan.

Results: 1) The perioperative symptoms (pain, tenderness and ecchymosis) were not almost severe:

Day 1: P $0 \pm 0.1(0-2)$, T $0.2 \pm 0.5(0-3)$, E $0.1 \pm 0.3(0-2)$, day 7: P $0 \pm 0.2(0-2)$, T $0.3 \pm 0.6(0-5)$, E $0.1 \pm 0.4(0-4)$, day 30: P $0 \pm 0.1(0-2)$, T $0.1 \pm 0.4(0-3)$, E $0 \pm 0.1(0-1)$ and day 90: P $0 \pm 0.1(0)$, T $0 \pm 0.2(0-1)$, E $0 \pm 0(0)$. There were neither of DVT/PTE nor allergic reaction. There were two cases of thrombophlebitis and two of sensory nerve disturbance, both of which were resolved at day 90. The ratio of EHIT (> class 2) was 6.3 % (29 out of 461 legs), all of which were resolved without DVT/PTE.

Discussion: There were tiny numbers of postoperative adverse events: thrombophlebitis and sensory nerve disturbance after RFA treatment. Also, there was no DVT/PTE, although EHIT happened occasionally. RFA is thought to be a safe treatment modality for varicose veins of lower extremities.

IS-P2-5 Short-term results of subfascial PAPs for the treatment of large cases of IPV.

Harukas KAWASAKI Clinic, Japan
Hiroshi Kawasaki, Kosuke Fujii

<Background> We would report a novel procedure, Subfascial PAPs (percutaneous ablation of perforators) (SAPs) against IPV with short-term results. We improved on PAPs to make higher curability.

<Methods> 129 cases (159 IPV) of SAPs were performed for 12 months in 2023.

Age: 25-88yrs, average 67 ± 1.2 , Gender: Male 52(62) Female 77(97), Postoperative follow up periods: 4.5 ± 0.3 months, Operation sites: A) GSV in lower leg 130 (82%), B) SSV 16 (10%), C) back site in thigh 11 (7%), D) GSV in lower thigh 2 (1%)

IPVs are located A) 12 ± 0.6 cm, B) 13 ± 2 cm above ankle joints.

IPVs: perforating point diameter 3.5 ± 0.3 mm, reflux 5.8 ± 0.3 cm/sec), Surgical procedure: local anesthesia + TLA +/- venous anesthesia (Flunitrazepam), direct puncture under US guide, Endothermelaser (LSO MEDICAL), Ringlight™ Fiber Probe, burning condition; pulse mode, output 7 wats, duration 7 sec, interval 0.5 sec, SAPs: Transluminal technique, short axis puncture, guide wire, Burning in lower leg GSV; SAPs burning length (subfascial/total) $32 \pm 0.7/ 63 \pm 1$ mm, energy 372 ± 12 Jules, time 56 ± 1.9 sec, LEED 59.0 J/cm,

<Results> pain ($\geq 1M$) 0, nerve injury 0, arteriovenous fistula 0, patent IPV with reflux 7

<Discussion> Improved points of procedure are suggested more important as follows,

- 1)Transluminal technique definitely with best direction, guidewire and well burning
- 2)Burning of perforating point
- 3)Adequate length burning can prevent nerve injury with lots of TLA

<Conclusion> Effectiveness and safety of subfascial PAPs (SAPs) against IPV are proofed with short-term results due to improved surgical techniques.