International session
IS-1

演題名：リンパ管エコーでリンパ浮腫を確定診断する

Definite diagnosis of lymphedema using lymphatic echography

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Abstract

Background We have reported the usefulness of echography as a preoperative examination for lymphatico-venous anastomosis (LVA).[1,2] As venous echography became a standard in diagnosing venous diseases in the lower extremities, we consider that echography can also become the standard for diagnosing lymphedema.

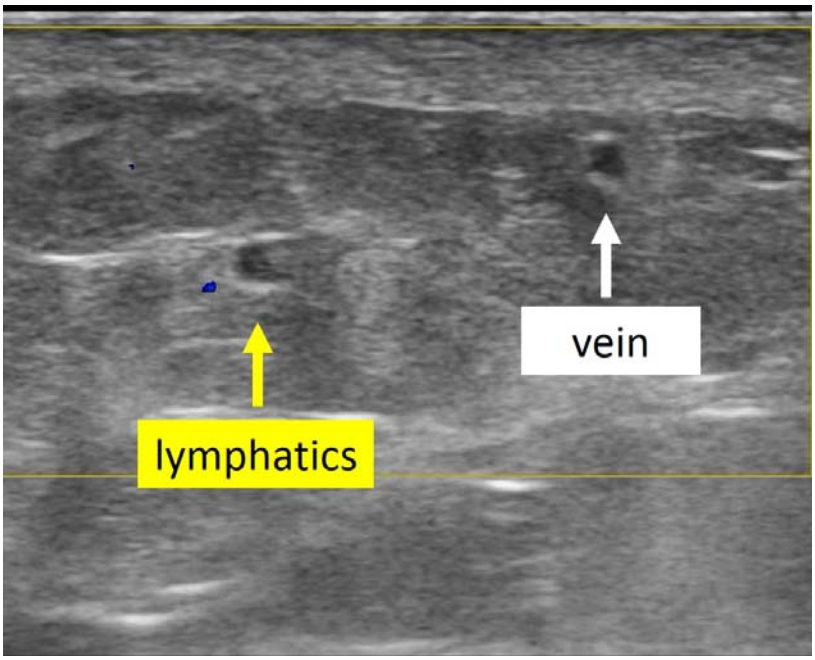
Patients and methods Fourteen patients (28 lower limbs) who underwent LVA for lower limb lymphedema was investigated. In the preoperative examination, we performed echography to detect the lymphatic vessels, using 18 MHz linear probe. Lymphatic vessels are sometimes difficult to distinguish from veins on ultrasound. Therefore, we established five indexes of "D-CUPS" to discriminate the two vessels (D: Doppler, C: cross, U: uncollapsible, P: parallel, S: superficial fascia). We evaluated the abnormal expansion or sclerosis of the lymphatic vessels in the medial side of the legs, which indicates the presence of lymphedema. Next, we performed indocyanine green (ICG) lymphography and diagnosed lymphedema. Then we compared the results of each examination.

Results Staging of lymphedema was stage 1 in 9 limbs, stage 2a in 7 limbs, stage 2b in 8 limbs, and stage 3 in 4 limbs. The sensitivity and specificity of diagnosing lymphedema based on echography in the medial area were 95.0 % and 93.8 %, respectively. The accuracy rate was 94.6 %. The sensitivity was 95 % both in the thigh and the lower leg, though the specificity was higher in the thigh than in the lower leg (100 % and 87.5 %, respectively). We could detect the lymphatic vessels with echography in 39 out of 54 areas where we

could not find them in lymphoscintigraphy or ICG lymphography (72.2 %).

Discussions The location and degeneration of the lymphatic vessels in the lymphedematous limbs could be evaluated with commonly-used echography. The low specificity may be because echography detects the expansion of the lymphatic vessels and diagnoses subclinical lymphedema.[3] Echography has a possibility to be used for the definitive diagnosis of lymphedema, instead of lymphoscintigraphy or ICG lymphography.

Figure: Image of echography indicating the dilated lymphatic vessel.



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【和文】

背景：われわれは以前からリンパ管静脈吻合術(LVA)の際に吻合するリンパ管を、エコーを用いて同定し、リンパ管硬化の評価を行ってきた。下肢静脈エコーが下肢静脈疾患診断の標準検査となったごとく、エコーをリンパ浮腫の確定診断に用いることができると考えた。

方法:当院で下肢 LVA を行ったリンパ浮腫患者 14 人 28 肢を対象とした。術前検査として、はじめにエコーを行った。大腿と下腿に分けて、リンパ管の位置と変性（拡張、硬化）の有無をエコーで確認し、赤外線カメラで感知しないペンを使ってマーキングした。次に、Lymphosome 毎に 1 肢あたり 3 箇所 ICG を皮下注射して赤外線カメラで観察し、リンパ管の位置をマーキングした。エコーでリンパ管拡張または硬化を認めた場合にリンパ浮腫であると診断し、エコーの所見と ICG 所見と比較した。

結果：患者は全員女性で、国際リンパ学会分類で Stage 1 が 9 肢、stage 2a が 7 肢、stage 2b が 8 肢、stage 3 が 4 肢であった。下肢内側領域においては、リンパ浮腫の有無について感度 95.0%、特異度 93.8%であった。大腿内側・外側、下腿内側・外側のうち、ICG やリンパシンチグラフィでリンパ管が描出されなかった 54 領域中 39 領域でエコーを用いて拡張したリンパ管を同定することができた（72.2%）。

討論：リンパ浮腫の患肢におけるリンパ管は、エコーで同定および変性の評価が可能であり、その所見を用いてリンパ浮腫の診断が可能であった。修練は必要であるが、エコーは ICG 検査やリンパシンチグラフィに代わり、リンパ浮腫確定診断のための標準検査となる可能性がある。

IS-2-1 Development of novel pharmacological therapy for secondary lymphedema: focusing on subcutaneous adipose tissues

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Background: Secondary lymphedema can develop after cancer surgery with lymph node dissection. Lymphedema causes swelling of extremities with skin fibrosis and increase of subcutaneous adipose tissues. However, pharmacological therapy is not well established. We developed a rat model of secondary lymphedema and investigated the pathophysiology. Subcutaneous adipose tissues increased in a rat model, and macrophages aggregated in the increased adipose tissues. These macrophages formed crown-like structures (CLSs), produced transforming growth factor-beta 1 (TGF-β1), and accelerated collagen synthesis. Recently, the inhibitory effect of eicosapentaenoic acid (EPA) against hyperlipidemia and TGF-β1 has been reported. In this study, we investigated the therapeutic effect of EPA for secondary lymphedema.
Methods: We created three rat groups: control (Ctr), lymphedema (LE), and lymphedema rats administered EPA for 168 days (EPA). The difference of limb volume, skin elasticity, amount of subcutaneous adipose tissues, the number of CLSs, the expression of TGF-β1 and collagen, and serum lipid levels were compared among three groups.
Results: Daily administration of EPA effectively decreased limb volume, skin elasticity, subcutaneous adipose tissue volume, the number of CLSs, the expression of TGF-β1 and collagen, and serum lipid levels.
Discussion: Adipocyte death is increased along with an increase of adipocytes in lymphedema. Following the death of adipocytes, lipid droplets are released into the extracellular space. To scavenge lipid droplets, macrophages aggregate around the adipocytes and form CLSs. Macrophage-inducible C-type lectin (Mincle) acts as a receptor, and released cholesterol crystals act as ligands. Activated Mincle is involved in the formation of CLSs and induces TGF-β1 expression in macrophages. In our study, CLS formation and TGF-β1 expression increased in the LE group, and decreased in the EPA group. Our results suggest EPA as a possible pharmacological treatment option for skin fibrosis with secondary lymphedema.

IS-2-2 Superficial vein thrombosis associated with varicose veins of the lower extremities

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[Background] Superficial vein thrombosis is considered as a risk factor for deep vein thrombosis and pulmonary embolism. However, few cases develop directly into deep vein thrombosis, and the diagnosis and treatment of such cases have not been established. It has been reported that thrombus in the saphenous vein close to the junction of a deep vein should be treated as if it were deep vein thrombosis.
[Purpose] The purpose of this study was to investigate the diagnosis and treatment of patients with varicose veins complicated by superficial vein thrombosis.
[Methods] Between October 2018 and October 2021, 14 patients (mean age 71 years, 4 males and 10 females) with superficial venous thrombosis were enrolled.
[Results] Endovascular treatment (ablation or embolization) was performed in 13 limbs. Thrombosis was found in the main trunk of the saphenous vein in 4 limbs. Two limbs were occluded from the junction with the deep vein, and one of them was treated with anticoagulation therapy. No patients had thrombophilia. No patients had active malignancies. There was no recurrence of superficial venous thrombosis during the observation period (3-36 months) although one patient had solitary soleus vein thrombosis 12 months after surgery.
[Conclusion] Anticoagulation therapy was not administered to all patients in the present study. There were also no cases of active malignancy and thrombophilia in this series. Since this paper consists of a small number of cases, we believe that a multicenter study or nationwide surveillance are to be considered.

IS-2-3 Short-term results of subfascial PAPs for the treatment of IPVs

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<Background> We would report a novel procedure, Subfascial PAPs (percutaneous ablation of perforators) (SAPs) against IPVs with short-term results. We improved on PAPs to make higher curability.
<Methods> 59 cases (68 legs) of SAPs against IPVs were performed for 9 months in 2021.
Age: 27~89yrs, average 66 ± 1.5, Gender: Male 27(32) Female 32(36), Postoperative follow up periods: 3.9 ± 0.4 months,
Operation sites: ①GSV in lower leg 45 (66%), ②SSV in lower leg 9 (13%), ③back site in thigh 11 (16%), ④GSV in lower thigh 3 (4%) IPVs are located ①13 ± 1 cm, ②17 ± 2 cm above ankle joints.
IPVs: perforating point diameter 3.2 ± 0.1 mm, reflux 4.9 ± 0.4 cm/sec), Surgical procedure: local anesthesia + TLA (no venous anesthesia), 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 82, short axis puncture 59, guide wire 70,
PAPs: Transpassing 33, short axis puncture 22, guide wire 17,
Burning in lower leg GSV; SAPs burning length (subfascial/total) 30 ± 1 / 63 ± 2 mm, energy 607 ± 37 Jules, time 86 ± 5 sec, LEED 96.3 J/cm, PAPs burning length 55 ± 4 mm, energy 379 ± 39 Jules, time 54 ± 6 sec, LEED 65.3 J/cm,
<Results> pain (≧1M) 0, nerve injury 2, arteriovenous fistula 0, IPV opening 7, reflux 5
<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 IPVs are proofed with short-term results due to improved surgical techniques.

IS-2-4 Post-thrombotic syndrome with leg ulcers can be treated by varicose vein surgeries

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Background: Post-thrombotic syndrome (PTS) is primarily treated with elastic stockings, which are problematic because they often have limited efficacy or are difficult to maintain. Particularly, leg ulcers are slow to heal, and the pathology may involve superficial veins and perforating branches. If local venous hypertension around the ulcer can be improved, the wound will heal. Therefore, surgical treatment of primary varicose veins could be applied to PTS.
Method: Of 14 patients who underwent surgical treatment of superficial veins and perforating branches for leg venous ulcers from April 1, 2021, to January 31, 2022, at our hospital, 12 patients who could be followed up until ulcer healing were included. Surgical methods were selected from EVLA, CAC, PAPS, and SEPS to best suit the pathological condition. In the PTS group (P group), patients with residual thrombus or pelvic vein stenosis were excluded, and only superficial veins or perforating branch insufficiency were treated. The primary endpoint was ulcer healing at 3 months postoperatively, and a non-inferiority test was performed on 8 patients in the primary varicose vein group (V group) and 4 patients in P group to clarify the usefulness of surgical treatment for PTS. As secondary endpoints, the Villalta score and rVCSS were measured preoperatively and postoperatively in the P group, and the change in symptoms due to surgical treatment was evaluated.
Results: Surgical treatment for the P group was non-inferior to that for the V group (p = 0.19, 95% CI -0.056 to 0.256). In the P group, all patients had healed ulcers and significantly improved symptoms at 2 months postoperatively without recurrence (Villalta score; p=0.023, rVCSS; p=0.034).
Discussion: Surgical treatment of superficial veins and perforating branches for PTS is acceptable. Further case series are desirable in order to properly evaluate surgical indications and methods.
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IS-3-1 The Current Status of Thrombosis and Anticoagulation Therapy in patients with COVID-19 in Japan From the CLOT-COVID Study

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Background: Data on thrombosis and current real-world management strategies for anticoagulation therapy are scarce but important for understanding current issues and unmet needs of an optimal management of patients with coronavirus disease 2019 (COVID-19).

Methods: The CLOT-COVID Study (thrombosis and antiCoaguLatiOn Therapy in patients with COVID-19 in Japan Study: UMIN000045800) was a retrospective, multicenter cohort study enrolling consecutive hospitalized patients with COVID-19 among 16 centers in Japan from April 2021 to September 2021, and we tried to capture the status of the patients in the fourth and fifth waves of the COVID-19 infections in Japan.

Results: Among 2894 patients with COVID-19, 1245 (43%) received pharmacological thromboprophylaxis. The proportion of pharmacological thromboprophylaxis increased according to the severity of the COVID-19 in 9.8% with mild COVID-19, 61% with moderate COVID-19, and 97% with severe COVID-19. The types and doses of anticoagulants varied widely across the participating centers. During the hospitalization, 55 (1.9%) developed thrombosis, mostly venous thromboembolism (71%). The incidence of thrombosis increased according to the severity of the COVID-19 in 0.2% with mild COVID-19, 1.4% with moderate COVID-19, and 9.5% with severe COVID-19.

Discussion: The present study revealed that the proportion of a pharmacological thromboprophylaxis was substantially higher than in the previous studies with a targeted population from the first and second waves of COVID-19 infections in Japan (43% vs. up to 25%)[1-4]. However, the proportion of a pharmacological thromboprophylaxis had not yet reached the "universal" pharmacological thromboprophylaxis for all hospitalized patients with COVID-19, as recommended by several current international guidelines in other countries[5]. On the other hands, in line with previous studies[1-4], the present study showed a lower incidence of VTE in hospitalized patients with COVID-19 than in the studies from Western countries[6-8]. Further investigations were warranted to clarify the optimal pharmacological thromboprophylaxis strategies for patients with COVID-19 in Japan.

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IS-3-2　Bioimpedance as a Diagnostic Modality for Chronic Venous Disease

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(Background)
Chronic venous disease is due to prolonged venous hypertension and associated structural changes. However, duplex ultrasound is a measure of valvular dysfunction and obstruction which may not reflect the actual pathology. Thus there is an unmet clinical need to have a diagnostic modality that may better predict chronic venous disease severity.
We previously agnostically explored predisposing risk factors for chronic venous disease using the UK Biobank. Leg bioimpedance emerged as a strong predictor for varicose veins. This was validated using cox regression analysis (hazard ratio of 0.43). Given these findings, this study was performed to determine if bioimpedance can be a biomarker to detect changes in venous insufficiency severity which is associated with changes in intravascular volume, tissue water retention and the microcirculation.
(Method)
Subjects are from the Stanford Vascular Center and data collection includes age, gender, BMI, CEAP, venous reflux patterns and bioimpedance spectroscopy data. Statistical significance was determined using ANOVA and t-tests.
(Results)
We acquired bioimpedance data on 118 patients with C0- 6 disease. There was a statistically significant difference between <C2 disease vs higher and also a difference between C3-5 vs C6 disease. The r value was 0.9 and statistically significant. Regarding reflux patterns, 70% had perforator reflux and 50% had deep reflux in C4-6 disease, which is significantly higher compared to below C3 disease. For C6 patients, L-Dex decreased with wound closure in all patients.
(Discussion)
Based on our findings, we think changes in bioimpedance may have a role in predicting venous leg ulcer onset and healing. Future questions include: Can this be helpful to predict response to therapy in advanced CVD patients and can this be used in strategies to prevent venous leg ulcer recurrence.

IS-3-3　Characteristics of Venous Leg Ulcer Patients at a Tertiary Wound Care Center

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Background: Venous leg ulcers (VLU) are defined as an open skin lesion of the leg in an area with venous hypertension, and they are the most common cause of chronic leg wounds[1]. However, the clinical characteristics of VLUs are not well defined. This study was performed to characterize VLUs in patients being treated at a wound care center.
Methods: We studied patients with VLUs presenting to the Stanford Advanced Wound Care Center in 2018. Of the 327 VLUs identified, we excluded 133 duplicate entries and 27 misdiagnoses, resulting in a final sample size of 167 patients. Patient, wound, care, and ultrasound characteristics were analyzed.
Results: Of the 167 patients, 46.1% were female. The average age was 74.7 years old, and the average BMI was 30.2. 54.5% of wounds were presented in multiples, 45.5% had cellulitis, 49.1% were recurring, and 39.5% were caused by trauma. Ultrasound results showed that the most common reflux patterns were below knee GSV reflux and calf perforator reflux, which was identify in 37.72% and 29.34% of the population. The patient sample under 60 years of age was 67.74% males, 61.29% presented with venous skin changes, and 51.6% had diabetes. The population older than 60 was 51.88% male, 37.59% presented with venous skin changes, and 31.58% had diabetes. BMI was greater in the patient sample younger than 60, with an average of 39.16, compared to the population older than 60 which had an average BMI of 28.17.
Discussion: Our findings suggest that VLUs in patients younger than 60 may be a result of metabolic factors, compared to mechanical factors in those older than 60. The common below knee GSV and calf perforator reflux, compared to axial GSV, raises the question of the optimal venous procedures. The differences in VLU pathology between patient populations suggest a potential benefit for a personalized approach to VLU treatment.
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IS-3-4 Time-restricted salutary effects of blood flow restoration on venous thrombosis and vein wall injury in mouse and human subjects

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Background: Up to 50% of patients with proximal deep venous thrombosis (DVT) will develop the post-thrombotic syndrome (PTS). While catheter-directed thrombectomy/thrombolysis (CDT) enabling restoration of blood flow (RBF) have demonstrated little benefit on PTS. Mechanisms underlying this finding remain unclear. Here, we examined whether RBF has a restricted time window for improving DVT resolution. **Methods**: First, experimental stasis DVT was generated in C57/BL6 mice (N=291) by inferior vena cava ligation. To promote RBF, mice underwent mechanical de-ligation with or without intravenous recombinant tissue plasminogen activator (rtPA), administered two days after de-ligation. RBF was assessed over time by ultrasonography and intravital microscopy. Resected thrombosed IVC specimens underwent thrombus, vein wall histological and gene expression assays. Next, we conducted a post-hoc analysis of the ATTRACT trial (NCT00790335) to assess the effects of CDT on VEINES quality-of-life (VEINES-QoL) and Villalta scores for specific symptom-onset-to-randomization (SOR) timeframes. **Results**: Mice that developed RBF by day (D) 4, but not later, exhibited reduced D8 thrombus burden parameters and reduced D8 vein wall fibrosis and inflammation. In mice without RBF, rtPA administered at D4, but not later, reduced D8 thrombus burden and vein wall fibrosis. Notably, in mice already exhibiting RBF by D4, rtPA administration did not further reduce thrombus burden or vein wall fibrosis. In the ATTRACT trial, patients receiving CDT in an intermediate SOR timeframe of D4-D8 demonstrated maximal benefits in VEINES-QoL and Villalta scores (between group difference=8.41 and 1.68 respectively, $p<0.001$ vs. patients not receiving CDT). CDT did not improve PTS scores for patients having an SOR time of <D4 or >D8. **Conclusions**: Taken together, these data illustrate that within a restricted therapeutic window, RBF improves DVT resolution, and CDT may improve clinical outcomes. Further studies are warranted to examine the value of time-restricted RBF strategies to reduce PTS in DVT patients.

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IS-4-1 What is the optimal anticoagulation therapy for patients with DVT associated with gynecological malignancies?

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[Background] Of the patients with DVT related to obstetrics and gynecology at our hospital, approximately 60% are associated with malignant tumors. The aim of this study was to investigate indications for anticoagulation therapy for DVT treatment.
[Subjects] Forty-seven DVT patients associated with gynecological malignancies identified at our hospital during a 6-year period from October 2015 to September 2021 were included in the study and the recurrence of venous thromboembolism (VTE) and bleeding events in these patients were investigated.
[Results] The 47 cases were divided into 9 cases with PE (group A), 15 cases of proximal DVT (group B) and 23 cases of distal DVT (group C). While anticoagulant was given to everyone in group A, only 11 out of 15 cases received it in group B, while in group C it was 16 out of 23. There were 4 cases of recurrent VTE after DVT was identified, 2 in group B and 2 in group C. Two patients developed PE in the absence of anticoagulation therapy, while one patient developed PE and another had an exacerbation of DVT despite being on anticoagulation therapy. There were 5 bleeding events in the 36 anticoagulated patients. One was preoperative, one was postoperative, one was during chemotherapy, and two were during the palliative care period. In all cases, fatal events could be avoided by discontinuing anticoagulation therapy before major bleeding occurred.
[Discussion] Many patients with DVT with malignancies are instructed to continue indefinite anticoagulant therapy. Therefore, VTE identification and VTE exacerbation, even in patients on anticoagulation, should be closely monitored and revaluated. Furthermore, to reduce bleeding events, reassessment of VTE and determination of the profitability of anticoagulation is important, especially when the patient's general condition changes or when the treatment plan of the primary disease is redesigned.

IS-4-2 Evaluation of prognosis between patients with and without residual deep vein thrombosis in acute pulmonary thromboembolism ～subanalysis of J'xactly study

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Background: There were limited date regarding to differences in prognosis between patients with and without residual deep vein thrombosis (DVT) in acute pulmonary thromboembolism (PE).
Methods: This study was the subanalysis of the J'xactly study, a multicenter prospective observational study. The study included 1016 patients with PE/DVT who received rivaroxaban between February 2016 and April 2018 in which 152 sites. We evaluated the differences in prognosis between patients with and without residual DVT in PE.
Results: Of the 1016 eligible patients, 597 had DVT only (proximal, 51.8%; distal, 48.2%), and 419 had PE with or without DVT. There was no significant difference in the groups in proportions of recurrence/aggravation of symptomatic venous thromboembolism (VTE) during a median observation period of 21.3 months: 4.4% (26/597) in the DVT and 4.1% (17/419) in the PE groups.
Of the 419 patients with PE, 320 had residual DVT. The proportions of recurrence/aggravation symptomatic PE and VTE-related death in the groups with and without DVT were 2.8% (9/320) and 3.0% (3/99), and 0.9% (3/320) and 1.0% (1/99); in the person-years method: 1.7% and 1.9%, and 0.6% and 0.6%, respectively, with no difference between the groups.
Of 320 PE patients with residual DVT, 39 implanted inferior vena cava filter (IVCF). Although there was no significant difference between the groups, the proportion recurrence/aggravation symptomatic PE was 0% (0/39) and 3.2% (9/281) and VTE-related death was 0% (0/39) and 1.1% (3/281) in the groups with or without IVCF, respectively.
Discussion: In this subanalysis, there was no difference in the incidences of recurrence/ aggravation of symptomatic PE between patients with PE and those with DVT who received rivaroxaban. In addition, there was no difference in the incidences of recurrence /aggravation symptomatic PE between PE patients with and without residual DVT, which were kept at low incidences.

IS-4-3 One year result and trend of length from saphenofemoral junction to the end of plugged great saphenous vein after cyanoacrylate closure (CC)

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BACKGROUND
We investigated 1-year result and trend of length from SFJ to the end of plugged GSV after CC.
METHODS
We consecutively operated 45 patients (age 64±14, male19) for GSV insufficiency by CC in 2020. We performed echography to measure length from SFJ to the end of plugged GSV (A) just after CC, at POD 1, POD 7, at 6months, and 1 year and computed tomography to evaluate residual varicose veins at 6months and 1 year and complications were investigated.
RESULTS
Fifty two legs were treated. The length of treatment was 15.1±5.3cm. Occlusion rate was 100% at POD 7. Side effects were redness (7 cases, 13%), pain (3), tenderness (2), foreign body sensation (2), EGIT III(3,5.8%).
The A (6.4±2.2) just after operation shortened to 4.5±1.9 at POD1 and 2.7±2.4 at POD7($P<0.001$). Those of 6 month (4.3±2.9) and 1year (3.8±2.4) were not different from that of POD 1 (N.S.).
The shape of edge of thrombus was tongue-like at POD 1, and it changed to gulf-like, usually distal to superficial abdominal vein at POD7.
At 6 months and 1 year diameter of GSV was shortened and crevasse opened centrally. Recanalization was 1 case (2.2%).
CT showed that diameter of GSV was shortened and varicose veins at calves were diminished or vanished except 1 case (2.2%). It was re-operated for insufficient perforator
Fifteen cases had residual symptom at 1 year (cosmetic 7, fatigue 3, et al.) .
DISCUSSION
Formation of occlusion site changed mainly due to thrombosis just after CC, at POD 1, and POD 7. At 6months and 1 year GSV showed organic changes including shortened dimeter and occluded site tend had crevasse.
One year result after CC was acceptable.

IS-5-1 The experience of CAC using VenaSeal

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Background: CAC using VenaSeal was on the market in December 2019; we evaluated and will report the clinical results of CAC.
Method: From January 2020 to December 2021, we performed CACs using VenaSeal 227 times for 220 limbs of 189 patients (72 males and 117 females) with an average age of 68.0, GSV192, SSV34, Giacomini vein 1. The diameter was 6.8 mm (GSV6.9, SSV6.4), and C2 was the most with 173 limbs, C4 was 39, C3 was three, and one limb each for C1 and C5.
The length of the treated vein was 28.9 cm for GSV, 10.3 cm for SSV, and 37 cm for Giacomini's vein. The stump length was GSV 17.8 mm, SSV 13.7 mm, and Giacomini vein 28.9 mm.A follow-up schedule was one week, one month, and three months after CAC using duplex ultrasonography, physical findings, and subjective symptoms.
Results: There were non-continuous sites of polymerized cyanoacrylate in some target veins, but blood flow was eliminated in all cases.
Postoperative complications were 25 of phlebitis, two of PAGE, and two of EGIT, but there were no severe complications.
Discussion: Phlebitis with redness, edema, induration, pain, and itching of the skin covering the treated veins occurred in 25 of the 227. In all cases, the anatomical features of phlebitis developed in GSV running shallower than the saphenous compartment. Treatment with corticosteroids, antiallergic agents, and NSAIDs alone or in combination was needed in 16 limbs.
Initially, it was reluctant to inject the adhesive intravenously, but the regurgitation blocking rate was comparable to ETA, with no severe complications. Currently, CAC is the first choice for patients aged 40 years or older with a saphenous vein diameter of no more than 12 mm and no clear history of allergies.