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AVF38

Combined Use of n-Butyl Cyanoacrylate and Foam Sclerotherapy in Great Saphenous Vein Truncal Ablation: Preliminary Experience.

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Objective: The objective of this study was to assess advantages, safety, feasibility, and midterm clinical and instrumental outcomes of the use of *n*-butyl cyanoacrylate (NBCA) glue combined with foam sclerotherapy for great saphenous vein (GSV) truncal ablation.

Methods: Between June and December 2018, all consecutive patients with truncal GSV incompetence and varicose veins underwent total chemical GSV ablation first with NBCA and then with foam (polidocanol 0.5%) injection. Foam (0.5% or 0.25%) was also used for collaterals. Clinical, Etiology, Anatomy, and Pathophysiology (CEAP) class, preoperative and postoperative Aberdeen Varicose Vein Questionnaire (AVVQ) scores, and color Doppler ultrasound control were evaluated preoperatively and at 1 month, 3 months, and 6 months after the intervention for each patient. The visual analog scale was used to assess pain during ablation and at discharge.

Results: Eighty limbs in 77 patients were enrolled (64 C2, 6 C3, 8 C5, 2 C6). Average GSV diameter was 9 ± 2 mm. Average amount of NBCA and foam used for a single patient was 0.8 ± 0.1 mL and 4.8 ± 1.1 mL, respectively. Average operation time was 17 ± 4 minutes. Occlusion rate was 100%, 100%, and 96.2% at 1-month, 3-month, and 6-month follow-up time, respectively. Preoperative AVVQ score was 19; at 1-month and 6-month follow-up, it was 8 and 7, respectively ($P < .001$ between preoperative and 1-month AVVQ scores). Average visual analog scale score was 2 during ablation and 1 at discharge ($P =$ NS). No anesthesia was required, except for percutaneous GSV cannulation. Elastic stockings (23-32 mm Hg) were used for 1 week.

Conclusions: The use of concomitant NBCA and foam seems to be a valid, safe, and durable technique. Further studies are required to assess long-term results and to compare this technique with other ablative interventions.

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AVF39

Improvement of Neuropathy After Venous Ablation

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Objective: Neuropathic pain and numbness are not considered symptoms of chronic venous insufficiency (CVI). Improvement in these symptoms after closure of incompetent great saphenous vein (GSV) has not been reported. After it was noted that some patients with CVI and neuropathy spontaneously reported improvement in their symptoms after venous ablation, this preliminary study was undertaken to determine how often this occurs.

Methods: During the course of 2 years, 20 patients with Clinical, Etiology, Anatomy, and Pathophysiology (CEAP) C3 or C4a CVI who reported neuropathic pain, numbness, or paresthesias in their routine review of symptoms were prospectively studied. All underwent successful laser ablations of incompetent GSV. None had arterial occlusive disease. None underwent objective neurologic testing. Eight (40%) had diabetic neuropathy and 12 (60%) had neuropathy from spinal disease. All of the procedures were performed only to treat the venous disease. Possible improvement of the neuropathy was not discussed with the patients because it was not considered to be secondary to CVI. All patients were evaluated clinically and with duplex ultrasound scans at 3 months and 1 year.

Results: At 1 year, all of the 20 GSVs remained closed. Thirteen (65%) of the patients noted improvement of their neuropathic symptoms on review of symptoms at 3-month follow-up. Four were diabetic and nine had spinal problems. Seven of these patients noted subjective improvement of their symptoms and six reported total relief of symptoms. At 1 year, the seven patients still had persistent improvement of their symptoms. Two patients had return of symptoms that had previously resolved. They noted that their symptoms were better than before their ablations. The other four patients remained asymptomatic.

Conclusions: In this preliminary observational study, 65% of patients with CEAP C3 or C4a disease and neuropathy noted improvement or resolution of their neuropathic symptoms after successful closure of incompetent GSV. The mechanism and durability of this improvement are unknown. A large-scale trial with possible inclusion of objective neurologic testing or inclusion of neuropathic symptoms in registries is suggested to determine whether the results of this observational study are reproducible and can be applied to clinical practice.

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AVF40

Retrograde Administration of Ultrasound-Guided Endovenous Microfoam Chemical Ablation Versus Endovenous Laser Ablation for the Treatment of Superficial Venous Insufficiency

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Objective: This study measured patient outcomes among symptomatic patients with superficial chronic venous insufficiency who were treated with retrograde ultrasound-guided polidocanol microfoam 1% or endovenous laser ablation in a community setting.

Methods: Between October 2013 and March 2019, there were 1030 symptomatic patients with C2 to C6 chronic venous insufficiency who received either polidocanol microfoam 1% or endovenous laser therapy (EVLT) and were observed for 23.4 ± 13.2 months (polidocanol group) and 36.4 ± 19.8 months (EVLT group). Of the 517 patients treated with microfoam polidocanol, 28 patients (5%) had skin ulcer, and 116 (22.4%) were treated previously with thermal or surgical intervention. All patients underwent a duplex ultrasound venous incompetence study to map perforators and veins to be treated. Incompetent veins were accessed with a micropuncture needle distal to the midthigh perforator, approximately 10 cm above the knee fold. For the patients treated with polidocanol microfoam 1% (517 patients), the leg was then elevated 45 degrees. Under ultrasound guidance, the incompetent great saphenous vein was closed with polidocanol microfoam 1%. A second injection was administered through the same catheter, directing the microfoam to flow in a retrograde fashion through the incompetent venous valves to the ankle. Endovenous laser ablation in the usual manner was used to treat 513 patients.

Results: All patients completed the initial treatment. In the polidocanol group, 112 (21%) required planned secondary treatment during

the follow-up period for residual venous reflux in the below-knee great saphenous vein. In the endovenous group, 45 (9%) required subsequent treatment of recurrent reflux. Complete elimination of venous valvular reflux and symptomatic improvement were documented in 486 patients (94%) in the polidocanol group and 450 (88%) patients in the EVLT group ($P < .01$). In the EVLT group, 12% of the patients had recurrent symptoms and required treatment with polidocanol.

Conclusions: Retrograde administration of polidocanol microfoam 1% is a safe and effective treatment with important clinical benefits for superficial venous insufficiency in a community practice. Based on the results of this study, polidocanol microfoam 1% chemical ablation is just as effective as thermal ablation (EVLT) for the treatment of superficial venous insufficiency and can be used in patients who might not be candidates for thermal ablation.

Author Disclosure: S Deak: Nothing to disclose.

AVF41

Socioeconomic Status and Clinical Stage of Patients Presenting for Treatment of Varicose Veins

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Objective: The association between socioeconomic status (SES) and chronic venous insufficiency has not been rigorously studied. This study aimed to determine the influence of SES on the clinical stage of patients presenting for chronic venous disease therapy.

Methods: By use of the local Vascular Quality Initiative Varicose Vein Registry at our tertiary referral center, all patients undergoing therapy for varicose veins between January 2015 and June 2019 were queried. SES was quantified using the Neighborhood Deprivation Index (NDI). This is a standardized and reproducible index used in research that summarizes eight domains of socioeconomic deprivation. It is based on census tract data derived from the patients' addresses at the time of the operation. The higher the number, the worse the patients' SES is. The association between SES and severity of the vein disease at presentation was studied with bivariate analysis of variance and linear regression analysis.

Results: A total of 449 patients had complete SES and Clinical, Etiology, Anatomy, and Pathophysiology (CEAP) class data and were included in the study. The mean age was 58 years; 67% were female, and 60% were white. CEAP class included the following: C2, 22%; C3, 50%; C4, 15%; C5, 5%; and C6, 8%. The average NDI was 0.03 (minimum, −1.45; maximum, 2.89). There was a linear correlation between the CEAP class at presentation and the NDI ($P < .05$; Fig). SES was not associated with history of deep venous thrombosis, prior vein treatment, use of compression therapy, or Venous Clinical Severity Score.

Conclusions: CEAP class at presentation for treatment of chronic venous disease is associated with SES. This may reflect that patients with a lower SES wait longer before seeking medical therapy for venous disease.

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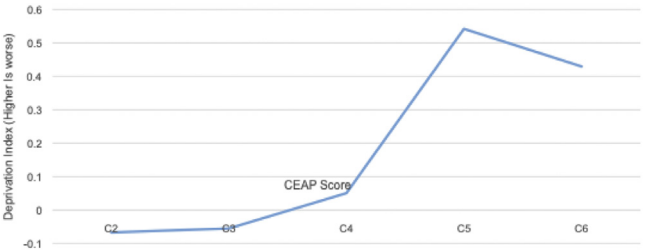

Fig. Association between Clinical, Etiology, Anatomy, and Pathophysiology (*CEAP*) class and socioeconomic status (SES) by Neighborhood Deprivation Index (NDI).

AVF42

Trends of Surgery for Varicose Veins in the Elderly

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Objective: During the past decade, treatment of varicose veins has shifted from the operating room to the office. Although recent studies demonstrated the safety of office-based venous ablation in the elderly, there is a paucity of published data on the contemporary outcomes of surgery for varicose veins in the operating room. This study analyzed the trends and outcomes for varicose vein surgery in the elderly using a large national database.

Methods: The American College of Surgeons National Surgical Quality Improvement Program database (2005-2017) was reviewed. Patients undergoing vein ablation or open surgery (high ligation, stripping, and phlebectomy) for venous insufficiency were identified by *Current Procedural Terminology* codes and principal diagnosis. Patients were stratified into three age groups: <65 years, 65 to 79 years, and ≥80 years. Preoperative and operative characteristics as well as outcomes were compared. Logistic regression was performed to identify risk factors associated with any adverse event, defined as any morbidity or mortality.

Results: There was a total of 48,615 venous operations; 18.9% (n = 9177) were performed in patients aged 65 to 79 years, and only 2.4% (n = 1180) were in octogenarians. The proportion of patients in the 65- to 79-year age group steadily increased during this period from 12.8% in 2005-2006 to 22.3% in 2017 ($P < .01$), whereas the proportion of octogenarians remained stable ($P = .23$; Fig). Octogenarians had significantly higher comorbidities, were more likely to undergo vein ablation alone ($P < .01$) for ulceration ($P < .01$), and were less likely to receive general anesthesia ($P < .01$) compared with younger

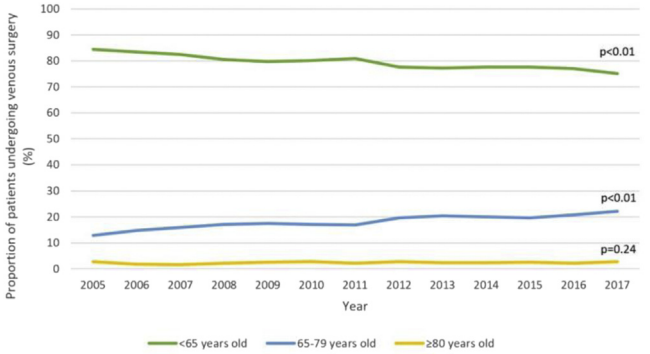

Fig. Proportion of venous surgery in the American College of Surgeons National Surgical Quality Improvement Program database by age.