Foam Sclerotherapy for Reticular Veins of the Dorsal Hands: A Retrospective Review

Anne Marie Tremaine, MD,* Daniel P. Friedmann, MD,† and Mitchel P. Goldman, MD†

BACKGROUND Despite being the gold standard for lower extremity reticular vein treatment, few studies have yet evaluated foam sclerotherapy for hand veins.

OBJECTIVE This retrospective study evaluates the safety and efficacy of foam sclerotherapy for reticular veins of the dorsal hands.

METHODS A telephone-based questionnaire was used for patient self-assessment of overall improvement, satisfaction, prevalence of adverse events, and willingness for repeat treatment after foam sclerotherapy with sodium tetradecyl sulfate (STS). All patients had been treated with foam STS of 0.25% to 1.0% concentration using room air.

RESULTS Twenty-one of 45 patients were successfully contacted, with a total of 54 treatment sessions performed on 38 hands. Overall, patients reported scores of 2.55 ± 0.56 for overall improvement (0 = none, 1 = mild, 2 = moderate, and 3 = complete resolution) and 1.79 ± 0.41 for satisfaction with results (0 = not satisfied at all, 1 = mildly satisfied, and 2 = very satisfied), with few significant treatment-related adverse events. Most patients stated they would undergo another treatment if needed.

CONCLUSION This single-center experience found that foam sclerotherapy with STS is a safe and effective treatment for reticular veins of the dorsal hands with excellent long-term patient satisfaction.

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Aging hands are characterized by prominent reticular veins, dyschromia, rhytides, and crepe-like changes that arise from atrophy of the skin and subcutaneous tissue as a result of innate aging processes and cumulative ultraviolet radiation. Although there are a variety of procedures to help revolumize the hands and treat pigmentedary changes, the treatment of dorsal hand veins is often overlooked. Bains and colleagues¹ evaluated the factors that influence perceived hand age using image-based patient questionnaires, some of which had veins, blemishes, and/or wrinkles digitally removed. The photographs with hand veins removed were graded as younger than the originals in all cases.

Sclerotherapy is the gold standard for the treatment of lower extremity reticular and telangiectatic veins.²⁻⁵ However, few studies have evaluated sclerotherapy of dorsal hand veins.⁶⁻¹¹ Duffy and colleagues⁸ evaluated the treatment of abnormally dilated dorsal hand veins with liquid sclerotherapy in a retrospective study of 100 patients. Patients received treatment with either 0.5% sodium tetradecyl sulfate (STS), 1.5% or 3% polidocanol (POL), all followed by post-sclerotherapy compression. The treatment failure rate was 80% with 0.5% STS or 1.5% POL versus 5% with 3% POL. Adverse events included pain, ecchymosis, matting, and edema. Bowes and Goldman⁹ treated enlarged veins on 14 hands (7 patients) with liquid 1.5 to 3% STS, of which, 11 of 14 hands demonstrated complete resolution of treated veins, with an average improvement of 97.8% without any adverse effects.
Mixing detergent sclerosing solutions (POL or STS) with room air or carbon dioxide has led to greater treatment efficacy because of prolonged contact between the foam and vessel endothelium, as well as decreased adverse effects through dilution of the sclerosant concentration. Although foam sclerotherapy has become increasingly popular in the treatment of leg veins, there are few reports in the literature regarding the safety and efficacy of foam sclerotherapy of dorsal hand veins. This retrospective study evaluates patient-graded treatment outcomes, satisfaction, adverse events, and willingness for repeat treatment after foam sclerotherapy of dorsal hand veins.

Methods

Patient and Data Procurement

This was a retrospective nonrandomized study of patients who received sclerotherapy for the treatment of dorsal hand (reticular or varicose) veins. Patients were recruited from a single private practice by electronic chart review. All patients who had dorsal hand veins treated with foam sclerotherapy from 2003 to 2012 were included in the study.

Patients were contacted by telephone and were asked to complete a verbal questionnaire to assess treatment outcome, satisfaction, occurrence of adverse events, and willingness for repeat treatment. Treatment outcomes were evaluated in terms of patient-graded improvement on a 4-point scale (0 = no improvement, 1 = mild improvement, 2 = moderate improvement, and 3 = complete resolution of veins). Patients graded their satisfaction with treatment on a 3-point scale (0 = not satisfied at all, 1 = mildly satisfied, and 2 = very satisfied). Finally, patients were asked whether they would undergo another treatment, if needed (0 = no, 1 = maybe, and 2 = definitely).

Adverse events, including pain, ecchymosis, edema, hyperpigmentation, erythema, pruritus, vessel matting, ulceration, and coagulum, were evaluated on a 4-point scale (0 = none, 1 = mild, 2 = moderate, and 3 = severe). For each adverse event, the duration of symptoms (in days) and the need for treatment were recorded. For patients with post-treatment coagula, the need for drainage (and the number of times needed) was recorded. The incidence of post-treatment systemic adverse events was recorded, including neurologic (headache, transient ischemic attacks, or vision change) or pulmonary (cough, chest pain, shortness of breath, or deep vein thrombosis) complications. Adverse event data were excluded for patients who had difficulty recalling their post-treatment course.

Injection Technique

A standardized technique based on the Tessari or double-syringe system technique was used for each patient who received foam sclerotherapy. Foam was created as previously described by Rao and Goldman. A sterile 5-mL syringe was used to draw 4 mL of room air. A separate 3-mL sterile syringe was used to draw 1 mL of 0.25%, 0.5%, or 1.0% STS (Sotradecol; Bioniche Pharma, distributed by Angiodynamics, Inc., Queensbury, NY). The 2 syringes were attached through a female-to-female connector, and the contents were mixed back and forth approximately 10 times, generating a homogenous foamed sclerosant. Concentrations of STS correlated directly with increasing vein diameter.

Patients were prepared and treated in a seated position with the hand/forearm perpendicular to their body. A nurse’s hand served as a tourniquet, wrapped around the mid-forearm to dilate the distal hand veins and impede the flow of venous blood and foam proximally. Veins were injected with foamed sclerosant from the 3-mL syringe using a direct puncture technique with a disposable 30-gauge, ½-inch needle. Most commonly, 3- to 5-mL of foam was injected into each hand. Immediately after the release of the make shift tourniquet, the hand was elevated (hand/forearm parallel to the body) and massage was performed in a proximal-to-distal direction starting from the mid-forearm. With the extremity still in an elevated position, cotton swabs were applied to the treatment site, and an elastic bandage was wrapped in a proximal direction from the mid-forearm. The elastic bandage was left in place for 24 hours. Patients were instructed to monitor their fingers for changes in color, sensation, and temperature, by loosening the TRENMAINE ET AL

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bandage if these symptoms occurred. In all but 1 patient, only one hand was treated per session to allow for normal function of the opposite hand, such as for driving. The alternate hand was typically treated the next day or within the week.

Results

Patient Population

Forty-five patients were identified as having undergone foam sclerotherapy of dorsal hand veins. Twenty-one were reached for follow-up by telephone or an in-office visit and were asked to complete a questionnaire. A total of 19 people did not respond to the calls for unknown reasons, 4 could not be reached secondary to disconnected phone numbers, and 1 had incomplete or unusable records. Of the patients reached by telephone, the mean follow-up time was 3.7 ± 2.8 (0.5–9) years after sclerotherapy. All patients received treatment with foamed STS solution.

Treatment Results

All 21 patients (38 hands) who received STS foam sclerotherapy and were successfully contacted were female. The average patient age at the time of treatment was 61.1 ± 10.2 (42–79) (mean ± SD [range]) years. Patients received an average of 1.42 ± 0.60 (1–3) sclerotherapy sessions per hand, with a total of 54 sessions. An average of 1.1 ± 0.6 (0.5–2.0) mL of solution was used per hand treatment, leading to 5.2 ± 1.6 (2.5–10) mL of foam per session. Sodium tetradecyl sulfate concentrations of 0.25% to 1.0% were used, with 0.5% (32 sessions) and 0.25% (13 sessions) predominating. The concentration of STS was not recorded for 8 treatment sessions.

Adverse Events

Patients were asked about post-treatment adverse events on a 4-point scale (0 = none, 1 = mild, 2 = moderate, and 3 = severe), and the mean scores for each adverse event were calculated (Figure 1). No patient reported post-treatment pruritus or ulceration. The average score for pain was 0.6 ± 0.8, with a mean duration of 7.4 days. Most patients required no treatment, although a minority used acetaminophen on an as-needed basis. Edema and erythema had mean scores of 0.8 ± 0.8 and 0.2 ± 0.4, respectively, both resolving within 3 to 4 days after treatment without intervention. Post-treatment ecchymosis was mild (0.3 ± 0.5), resolving at a mean of 3.7 days, either with arnica or without intervention. One patient reported moderate hyperpigmentation lasting 4.5 months, with no treatment required. Thirteen patients (61.9%) experienced coagulum formation or subjective hardening of veins, with a mean score of 1.2 ± 0.5. Most coagula required drainage with a 22-gauge needle at 2-week follow-up, with most patients returning only once (range, 1–4) for this procedure. All patients had resolution of coagula at 2 months. Although there were no reports of telangiectatic matting, 2 patients experienced post-treatment enlargement of the neighboring veins.

Figure 1. Subject-reported adverse event severity. Four-point scale (0 = none, 1 = mild, 2 = moderate, and 3 = severe). Adverse events were mild with a markedly low rate of hyperpigmentation.
No patients reported headache, vision changes, transient ischemic attack-like symptoms, deep vein thrombosis, chest pain, or cough after treatment. One patient with a history of “mild asthma” reported shortness of breath that lasted 20 minutes after 2 of 3 sclerotherapy sessions, which resolved without intervention. One patient reported difficulty obtaining intravenous (IV) access of her forearm veins after her treatment sessions.

Treatment Outcome and Patient Satisfaction
Patients reported an average overall improvement in the appearance of veins as $2.55 \pm 0.56$, based on a 4-point scale (Table 1). The average patient satisfaction with the treatment was $1.79 \pm 0.41$, based on a 3-point scale (Table 2). Patients were also asked about the likelihood of undergoing another treatment: 17 reported definitely, 2 reported maybe, and 2 reported that they would not undergo another treatment (Table 3). Figures 2 and 3 demonstrate the significant cosmetic improvement in dorsal hand veins that can be achieved with 1 to 2 treatment sessions.

Discussion
Prominent reticular veins greatly contribute to the appearance of the aged hand. Although effective for the treatment of these dorsal hand veins, foam sclerotherapy is not yet widely used, and the literature is lacking in terms of treatment outcomes and side effect profiles. We report the results of a retrospective review of patient-reported outcomes and treatment satisfaction in 21 patients who received 0.25% to 1.0% STS foam sclerotherapy for the treatment of dorsal hand veins.

Overall, patients were satisfied with their results, and most stated they would undergo another treatment. Unsatisfied patients felt that although the veins had improved, their hands did not appear younger. In these cases, patients also had considerable loss of dorsal hand subcutaneous tissue and would have benefited from volumizing with soft-tissue fillers.

Adverse events experienced after treatment were not similar to those seen with sclerotherapy of leg veins. The most common adverse event was coagulum formation, which is consistent with previous studies, followed by mild pain, erythema, bruising, and edema. Only 1 patient had slight hyperpigmentation that resolved over a few months, far less than the 20% to 30% incidence of hyperpigmentation reported for leg veins treated with sclerotherapy. There were also no reports of pruritus, ulceration, or matting/new vessel formation. Although 14.5% of

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<th>TABLE 2. A Majority of Patients Were Very Satisfied With Treatment Results</th>
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<td><strong>Patient Satisfaction (Score)</strong></td>
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<td>-----------------------------------------------</td>
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<tr>
<td>Very satisfied (2)</td>
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<tr>
<td>Mildly satisfied (1)</td>
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<td>Not satisfied at all (0)</td>
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SD, standard deviation.

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<th>TABLE 3. Most Patients Reported Being Amenable to Repeat Treatment, if Needed</th>
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<td><strong>Patient-Reported Likelihood of Repeat Treatment (Score)</strong></td>
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<tr>
<td>Definitely (2)</td>
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SD, standard deviation.
patients experienced matting on the dorsal hands in Duffy’s experience, it was limited to the group treated with a higher concentration of liquid sclerosant (3% POL). One of our patients experienced shortness of breath that resolved without intervention 20 minutes after sclerotherapy. After the treatment, the patient reported a history of mild asthma controlled with occasional use of an albuterol inhaler since childhood. This was the only systemic side effect reported among all patients and was most likely a result of asthma-related pulmonary hypersensitivity to air. A known allergy to a sclerosant and severe asthma or allergies are relative contraindications to the use of sclerosants other than hypertonic saline.

Opposition to sclerotherapy of the dorsal hands stems from concerns over difficulty with future IV access, as well as its impact on venous outflow from the hand. One patient in this study did report difficulty obtaining IV access after procedure. Interestingly, Shamma and Guy reported that patients with prominent hand veins are likely to have prominent veins throughout their upper extremities. Regardless, it would seem prudent to examine the veins of the entire upper extremity and reserve treatment only for patients with

Figure 2. Left dorsal hand veins after 2 sessions (2 months apart) using 0.5% STS. (A) Before treatment. (B) After Session 1. (C) After Session 2.

Figure 3. Right dorsal hand veins (A) before treatment and (B) after a single session using 1.0% STS.
prominent and enlarged veins. Further contraindications to treating dorsal hand veins are listed in Table 4.

There are 3 independent, albeit communicating, systems of venous outflow from the hand: superficial palmar veins, deep palmar veins, and dorsal veins that are found superficially within subcutaneous tissue. Thus, most, if not all, digital veins have valves that direct flow from palmar to dorsal, distal to proximal, and radial to ulnar directions, making the dorsal veins the main route for venous outflow. However, the superficial and deep venous systems of the hand and forearm have numerous communicating branches that create a highly redundant system (Table 5).

The lack of persistent hand swelling after destruction of these veins is likely due to the marked venous redundancy of the hand. In the hand surgery literature, there is little concern with complications of venous injury for this same reason. In a study of 28 patients treated with endovenous ablation of dorsal hand veins with a 940-nm diode laser, hand swelling occurred in all the treated hands but lasted 14 days or less. Cases of uniform swelling of the entire upper extremity only occur with obstruction of larger, more proximal veins. Such examples include deep vein thrombosis of the axillary vein or subclavian vein, or with venous hypertension seen with arteriovenous fistulas in transplant patients.

Outflow obstruction is possible with occlusion of the cephalic vein, basilic vein, and medial cubital vein of the forearm. In patients congenitally lacking any of these veins, the remaining veins usually increase in size to compensate. Limiting treatment of sclerotherapy to the dorsal venous network and the dorsal metacarpal veins on the hand will leave the veins of the forearm unaffected, and venous return can occur from the palmar venous network.

The main limitations of this retrospective study are patient recall bias (of post-treatment adverse events), missing data points from incomplete charting, and a small sample size. Further studies are necessary to confirm the safety and treatment outcomes of foam sclerotherapy in the treatment of reticular and varicose veins of the dorsal hands.

**Conclusion**

Based on our experience and a review of the literature, foam sclerotherapy seems to be a safe and effective means for treating prominent reticular veins of the dorsal hands. Patients had excellent long-term
satisfaction and experienced far less adverse events compared with sclerotherapy of leg veins. Prospective studies with in-office follow-up and a larger sample size are necessary to confirm these findings.

References


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