Endovenous laser ablation and concomitant foam sclerotherapy: experience in 320 patients

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1. Purpose

Endovenous laser ablation (ELA) is a well-established alternative to surgery in the treatment of truncal and perforating vein insufficiency. After the refluxing truncal or perforating vein is ablated, the remaining varicosities are either removed with phlebectomy, or alternatively, treated with sclerotherapy **(1-3)**. Sclerotherapy is traditionally performed using liquid agents, but foam sclerotherapy is becoming more and more popular **(4)**. In the literature, there is little data on the concomitant use of foam sclerotherapy following ELA **(5,6)**. In this single center series, we present our experience in 320 patients in whom ELA and foam sclerotherapy were performed in the same session.

2. Materials/Methods

Between July 2005 and November 2009, concomitant foam sclerotherapy of the varicose veins were performed in 320 out of 413 patients who underwent endovenous laser ablation for truncal and/or perforating vein insufficiency. Demographic and clinical data of these patients are presented in table 1.

Table 1: Demographic and clinical aspects of 320 patients who underwent ELA and concomitant USGFS

Number of patients	320 (540legs)
Sex	276 F/44 M
Clinical classification (CEAP) in 540 legs	C1 (n=44) C2 (n=239) C3 (n=110) C4a (n=53) C4b (n=41) C5 (n=32) C6 (n=21)
Refluxing vein(s) in 540 legs	GSV (n=315) SSV (n=74) PV (n=26) Combined (n=125)

In all patients, the ELA procedure was performed with US guidance under local tumescent anesthesia. In 57 patients, a femoral or sciatic nerve block was also performed to provide better analgesia. In

patients with bilateral disease, ELA was performed in both extremities in the same session (n=199), or in a separate session (n=21). Depending on the diameter of the refluxing veins, 50-90 Joules/cm energy was given during the laser ablation. After all ELA procedures were completed (unilateral or bilateral), the remaining varicosities were treated with ultrasound-guided foam sclerotherapy (USGFS). For USGFS, first, multiple butterfly needles were placed into the varicosities under US guidance with the patient in the reverse Trendelenburg position. Then, a thick foam was prepared according to the Tessari method, using a mixture of 1%-3% polidocanol solution and air in a 1:4 ratio. The foam was then injected via the butterfly needles into the varicosities under US guidance with the patient in a slight Trendelenburg position (Figure 1).

figure 1.jpg

Figure 1: US-guided foam sclerotherapy

Whenever possible, the foam was intentionally directed into the laser-ablated veins to create additional ablation of the refluxing veins with the foam. When all the varicosities were filled with echogenic foam, the injection was stopped. The patient then put on compression stockings and walked for 20-30 minutes.

Follow-up color Doppler US were performed at 1, 6 and 12 months.

3. Results

ELA was technically successful in all cases although another venous puncture was necessary in 21 legs with tortuous GSV's. Concomitant foam sclerotherapy was also technically successful in all cases. But during the follow-up, persistent reflux was seen in the varicose veins in 171 legs, although the refluxing trunkal/perforating veins were closed. In these legs, distal perforating vein reflux was present in 21 but in the remaining 160 legs, no source could be identified. These veins were treated with repeat USGFS 1-3 times. After the procedures, complications occurred in 110 legs including hyperpigmentation, telengiectatic matting, skin necrosis, calf vein thrombosis and others (Table 2).

Table 2: Complications after ELA and foam sclerotherapy in 320 patients (540 legs)

Complications	**Patients/legs**	**Outcome**
Coughing	171 patients	Disappeared spontaneously
Nausea/vomiting	18 patients	Disappeared spontaneously in 16, antivomiting drug given in 2
Hyperpigmentation	72 legs	Disappeared in 68, persisted after 1 year in 4
Telengiectatic matting	31 legs	Disappeared in 27, persisted after 1 year in 4
Skin necrosis	5 legs	Healed completely within 4 months
Calf vein thrombosis	3 legs	Resolved in 1 month
Transient paresthesia	21 legs	Resolved within 4 months
Visual disturbances	3 patients	Resolved in 15 minutes

During the 1-48 months follow-up (Mean±SE: 10,81±0.58 months), no recanalization was seen in the laser-ablated truncal and perforating veins (Figures 2a-c).

figure 2a.jpg

Figure 2A: The images show large varicosities in the anterior thigh and lateral calf in a 37 year-old lady with a C4b venous insufficiency.

figure 2b.jpg

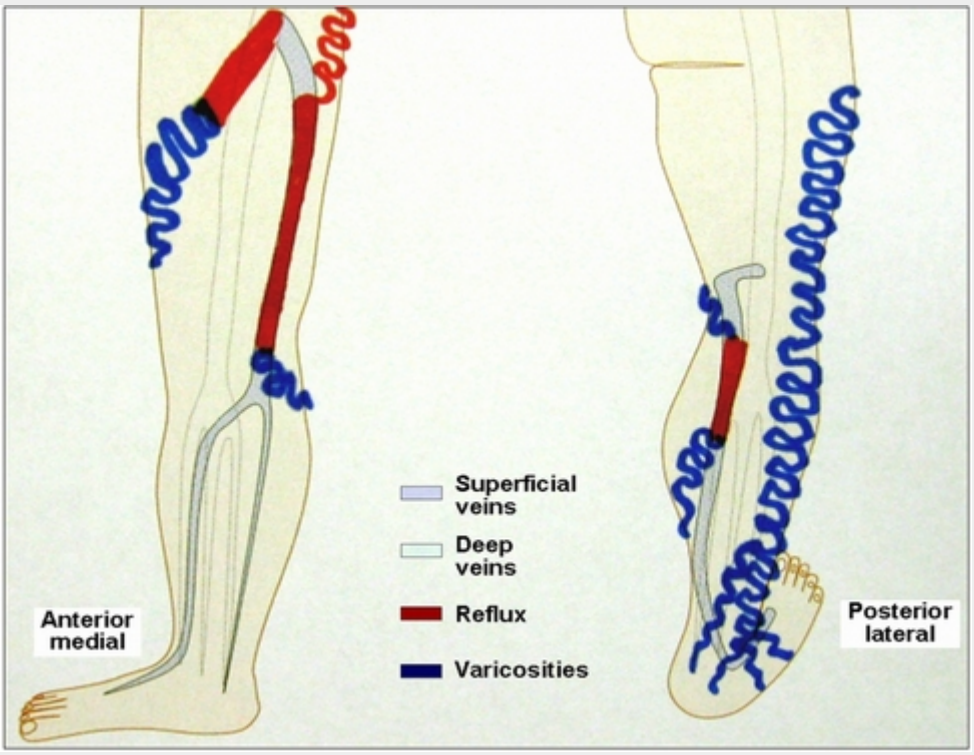

Figure 2B: The preoperative color Doppler mapping shows a duplicated GSV; both GSV were incompetent (one primarily and the other secondary to pelvic varicosities), and the SSV was also incompetent secondary to GSV insufficiency (red lines). The resultant varicose veins (blue lines) were located predominantly on the lateral surface of the leg. After the refluxing truncal veins (2 GSVs and 1 SSV) were ablated with ELA, the remaining varicose veins were treated with foam sclerotherapy.

figure 2c.jpg

Figure 2C: Six months after ELA and foam sclerotherapy, images show almost complete disappearance of the varicose veins and a remarkable reduction in edema, with a slight pigmentation over the course of the varicose veins.

4. Conclusion

In truncal and perforating vein insufficiency, traditional method to treat remaining varicosities after ELA is ambulatory phlebectomy (AP) **(3,7)**. Although excellent cosmetic results can be obtained in experienced hands, AP has some drawbacks. First, it is a surgical procedure that requires special surgical instruments which is not very suitable in the office setting. Second, it is a time consuming treatment and most IRs are not familiar with this technique. Third, although large varicose veins can be successfully removed, small reticular and spider veins remain after AP and these veins should be treated with sclerotherapy. And forth, the idea of their veins "removed with hooks" is not welcome by many patients.

Another method to treat remaining varicosities after ELA is sclerotherapy. Sclerotherapy is traditionally performed by injecting sclerosing liquids into the varicosities. Liquid sclerotherapy has been an excellent treatment for spider and reticular veins but proved unsuccessful for the varicose veins **(4)**. Thus, the only option for varicose veins has been AP until recently.

In the last decade, foam sclerotherapy was introduced and has become increasingly popular. Foam sclerotherapy has certain advantages over liquid sclerotherapy. First, since liquid mixes instantly with the blood, its concentration drops and its ablative effect diminishes rapidly. On the contrary, foam pushes the blood, rather than mixing with it, and may retain its concentration over a long distance in the vein lumen. As a result, its ablative effect is several times stronger than the liquid, and for this reason, it is suitable for the treatment of even large varicose veins. Second, because it is mixed with air, it contains less drug, but it becomes more effective. As a result, the amount of sclerosant and the number of injections to obtain a certain ablative effect are reduced. And third, foam is readily visible

on ultrasound, and because it is lighter than blood, it can be easily directed into the target vessels by manual massage and by putting the leg in certain positions **(4)**.

Although successfully used in truncal and perforating vein ablation instead of endovenous laser or radiofrequency, foam sclerotherapy is most commonly preferred in the treatment of pelvic-gonadal vein insufficiency and for the ablation of remaining varicosities after ELA of truncal and perforating veins **(4)**. In the literature, we could find only 2 studies reporting the results of concomitant use of foam sclerotherapy after endovenous ablation **(5,6)**. In both, the combined treatment was associated with a high success rate (98-100% closure of the refluxing veins) and a low complication rate. Similarly, during the 1-48 months follow-up, there was no recanalization of the refluxing veins in our study. We believe that routine Doppler US follow-up of all patients including the asymptomatic ones, repeated foam sclerotherapy of varicosities until no reflux was seen and intentional manipulation of the foam into the laser-ablated veins to create additional ablation after ELA may have prevented the recurrence in our series.

In our study, we saw some minor complications immediately after foam sclerotherapy including coughing, nausea-vomiting and transient visual disturbances, which invariably resolved within 15-20 minutes after the procedure. Other minor complications included hyperpigmentation and telengiectatic matting (due to foam sclerotherapy) which mostly resolved within one year, and transient paresthesia (due to ELA) which resolved within 4 months. In our study, major complications occurred in 8 legs (1.4%): Skin necrosis was seen in 5 legs which may be due either to foam extravasation or after foam intravasation into a small artery. All the necrotic wounds healed within 4 months, although systemic and topical antibiotics were necessary in 3 legs. Calf vein thrombosis was seen in one of the crural veins in three legs. All the patients presented with ankle swelling several days after the procedure, and successfully treated with low molecular weight heparin. In our study, we took some measures to reduce the risk of deep vein thrombosis: 1. Instead of injecting a large volume of foam via a single puncture, we injected small volumes via multiple punctures. 2. We avoided injection near to perforating veins. 3. When we saw filling of the deep veins with foam, we stopped the injection at that site and continued the injection via another puncture. 4. We always performed foam sclerotherapy after all ELA were finished, and made the patient walk for 20 minutes immediately after the procedure. 5. We instructed the patient to be active (walking or performing foot exercises) for at least 4 hours after each foam sclerotherapy session.

In our experience, concomitant use of foam sclerotherapy with ELA provides some advantages: First, since the refluxing vein and the varicosities are treated in the same session, the total duration and cost of the treatment are reduced, and the period spent in compression stockings is shortened which is preferred by the patient. Second, if the varicose veins are left untreated following ELA, they may be thrombosed due to stagnation. This may complicate or interfere with the subsequent sclerotherapy (or phlebectomy) and may require anticoagulant treatment. Foam sclerotherapy performed shortly after ELA prevents this complication. And third, passage of the foam from the varicosities into the laser-ablated refluxing truncal or perforating veins creates an additional ablation, and this may result in a more durable occlusion.

In conclusion, endovenous laser ablation and concomitant foam sclerotherapy is feasible and effective. The procedures are associated with a low complication rate and can be performed in both legs in the same session. Concomitant use of laser and foam may potentially decrease the recanalization rate of laser-ablated vessels.

5. Reference

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6. Mediafiles

figure 1.jpg

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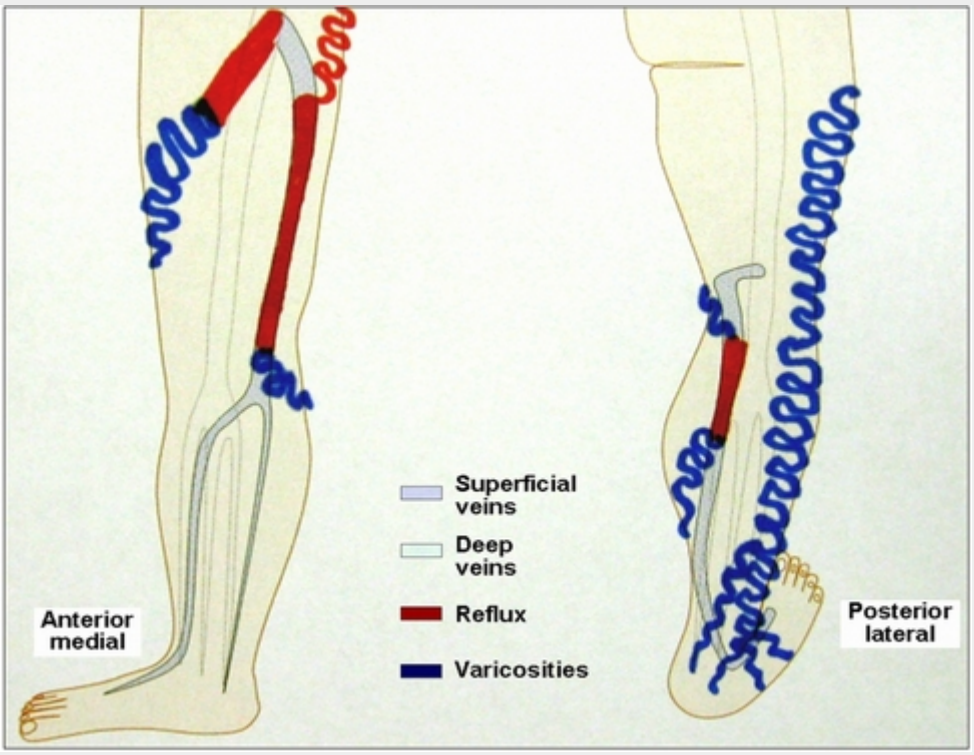

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