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Endovenous Laser Ablation: Other Veins.

L'ablation par laser endoveineux des veines non saphènes.

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Summary

Endovenous laser ablation is a well-established technique for ablation of great saphenous vein, and has been reported to have excellent early and mid-term results in treatment of the SSV.

There is much less experience reported in the treatment of other veins such as accessory saphenous veins, vein of Giacomini, and thigh circumflex veins.

This paper will review the current data as well as technical considerations regarding endovenous laser treatment of these veins.

Keywords: *endovenous thermal ablation, endovenous laser ablation, saphenous vein, accessory saphenous vein, intersaphenous vein, vein of Giacomini, thigh circumflex vein, varicose veins.*

Résumé

L'ablation par laser endoveineux est une technique bien établie pour l'ablation de la veine grande saphène et d'excellents résultats précoces et à moyen terme ont été rapportés pour celui de la petite veine saphène.

Il y a beaucoup moins d'expériences rapportées pour le traitement des veines accessoires des veines saphènes, des veines de Giacomini et des veines circonflexes de cuisse.

Ce document passe en revue les données actuelles de la littérature, ainsi que les considérations techniques concernant le traitement par laser endoveineux de ces veines.

Mots-clés : ablation thermique endoveineuse, ablation par laser endoveineux, grande veine saphène, veine saphène accessoire, la veine intersaphenienne, veine de Giacomini, veine circonflexe de cuisse, veines variqueuses.

Background

In the last decade, endovenous thermal ablation (EVTA) has become the most frequently used treatment for saphenous incompetence, and has dramatically changed the treatment of varicose veins.

The main advantages are that it is minimally invasive and readily performed under tumescent anesthesia in an office setting.

According to a meta-analysis, recurrence rates after treatment of varicose veins are lower after EVTA than classic surgery [1].

Generally accepted indications for EVTA include duplex-ultrasound documented reflux in an intrafascial or subsurface epifascial venous segment when associated with varicose veins of cosmetic or medical significance [2].

EVTA can be used to treat any sufficiently straight truncal or superficial vein that would allow passage of the fiber/catheter in a patient without contraindications (see **Table 1**).

Allergy to local anesthetic
Hypercoagulable states
Infection of the leg to be treated
Nonambulatory patient
Peripheral arterial insufficiency (ABI < .7)
Poor general health
Pregnancy
Recent/active venous thromboembolism
Thrombus or synechiae in the vein to be treated
Tortuous vein
Lymphedema
Severe deep venous obstruction

TABLE 1 : Relative Contraindications for EVLA.

Treatment of truncal veins is typically done either prior to or at the same time as surface varices.

Endovenous laser ablation (EVLA), the most widely utilized form of EVTA, is a well-established technique for ablation of great saphenous vein (GSV) reflux, with a high rate of efficacy and excellent safety profile [3].

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It has been recommended over open surgery [4].

The role of EVLA in the treatment of other veins is not as well established.

At the time of writing of this article, a pubmed search for "endovenous laser great or greater saphenous" yielded 210 hits while a search for "small" or "lesser" saphenous yielded 74 hits.

A search for "perforator, perforating, or perforators" yielded 9 hits while one for "accessory" veins yielded only 2 hits.

Thus, although EVLA has been said to be indicated for various types of incompetent veins [5], one should not assume that results in the GSV predict results in the small saphenous vein (SSV) or other veins.

EVLA of the SSV, presented in more detail elsewhere in this publication, has been reported to have excellent early and mid-term results [6]. Recently, the first randomized controlled trial comparing EVLA of the SSV *vs*. conventional surgery was published [7].

Outcomes evaluated included successful elimination of axial reflux on duplex, visual analog pain scores, recovery time, complication rates, Venous Clinical Severity Score, and quality of life assessment.

EVLA was found to yield the same clinical benefits as conventional surgery but was more effective in addressing the underlying pathophysiology and was associated with an easier post-operative recovery.

There is considerably less experience with laser ablation of perforator veins, discussed in another chapter, and other veins, taken up here.

Accessory Saphenous Veins

Accessory saphenous veins are venous segments in the saphenous space that run parallel to saphenous veins in the thigh and leg.

In the thigh, anterior accessory saphenous veins (AASVs) are anterior and lateral to the GSV, while posterior accessory saphenous veins (PASV) are located posteriorly to the GSV [8].

They typically are in their own intrafascial compartment, which often joins the GSV compartment proximally. AASVs may terminate into the GSV, a tributary of the SFJ, or directly into the femoral vein either below or above the SFJ.

Termination patterns of the PASV are not well described, but probably have the same variability as the AASV. The AASV is more common than the PASV.

The AASV has been found to be incompetent in 10.9%-14% of patients with varicose veins [9, 10].

Theivacumar et al. studied short-term outcomes in 33 patients undergoing EVLA for treatment of AASVs [11]. At one year, vein ablation rates, patient satisfaction and Aberdeen Varicose Vein Symptom Severity Scores were similar to a group of age-sex matched controls that had had GSV ablation.

Chaar et al. reported on their retrospective analysis of 565 patients who underwent EVLA (810 nm) for GSV (77.3%), SSV (15.5%) and AASV (7.3%) incompetence [12].

Failure to achieve closure was found in 1.6% of GSVs, 8.8% SSVs, and 13.2% AASVs ($p < 0.001$).

They utilized 120 J/cm for the first 10 cms and 60 J/cm distally. As a result of the high failure rate, they recommended ample use of tumescent solution and at least 120 J/cm for the first 10- 15 cm of vein treated.

Chaar et al. noted that ***Theivacumar et al.*** had used strict anatomical selection criteria, with the veins treated having a 10-cm relatively straight segment without proximal varicosity.

Although these strict criteria produced a 100% success rate, 30% of patients with AASV reflux were excluded and underwent open surgery.

There is virtually no significant data on the outcome of EVLA alone of PASVs.

Vein of Giacomini (Intersaphenous Veins) and Thigh Extensions of the SSV

- The Vein of Giacomini (VG) represents a form of thigh extension of the SSV that connects the SSV with the GSV, generally *via* the posterior thigh circumflex vein [8].
- Reflux of the VG is found in about 4-6% of limbs in which varicose veins are present, with a somewhat higher incidence in patients with recurrent varicose veins [13, 14, 15].
- Reflux typically occurs with retrograde flow originating in the GSV or pelvic veins. Much less commonly there may be a "paradoxical" varicose vein pattern with upward diastolic flow from the saphenopopliteal junction [16].

In a prospective study using 980 nm diode laser, ***Park et al.*** reported technical success in all 18 limbs treated.

They noted vein closure in all 18 limbs after one month, in 12 of 12 limbs after six months and in six of six limbs after twelve months. Varicose tributaries were treated with foam sclerotherapy just before EVLA was performed. No major complications occurred.

Another study of 18 patients followed for two years, also using foam sclerotherapy at the time of EVLA, reported successful ablation in all patients without complications [17].

Other Leg Veins

The anterior and posterior thigh circumflex veins are tributaries of the GSV, and usually present as tortuous varicose veins near the surface of the skin. As such they are typically treated with sclerotherapy or ambulatory phlebectomy. However, sometimes there are short straight incompetent segments proximally that may be amenable to EVLA. There is no data on efficacy or safety of treatment of these veins.

Hand Veins

Although EVLA has been reported in hand veins, the author doesn't recommend it's use in this setting as cannulation may be more difficult, postoperative swelling is common, and the expense is hard to justify [18].

Technical Considerations

EVLA of the GSV is generally a rather straightforward procedure, particularly in relatively long straight veins with a diameter of at least 4 mm. Obtaining adequate access may be more difficult when treating other veins, particularly with short segments of incompetence. Patient positioning will vary based on which vein(s) will be treated.

Vein entry should be the point of lowest reflux, although sometimes access of intersaphenous veins will be easier through the SSV.

Tributary veins and AASVs may be more prone to spasm than the GSV.

- Access can be facilitated by the use of reverse Trendelenburg position, a warm room, topical nitroglycerin, and measures to increase patient comfort and reduce anxiety.
- Other useful measures can include use of a 21g micropuncture kit, obtaining vein access on the 1st puncture, and rapid placement of the introducer then wire. Normal saline can be injected through the sheath if advancement is difficult.
- If accessory veins are to be treated at the same time as the GSV it is advisable to place sheaths in those veins first.

Fiber tip placement should be just distal to the junction with the main trunk of the GSV for the VG, anterior circumflex, posterior circumflex, and AASV and PASV if they terminate in the GSV. Placement shoud be ~2 cm distal to the common femoral vein if the AASV or PASV join that vein directly.

Tumescent anesthesia is employed as with all EVLA procedures.

There is inadequate data on which to evaluate the risk of pigmentation and other skin damage from treatment of epifascial veins. However, anecdotal experience suggests that the careful use of tumescent anesthetic solution can usually be used to create adequate distance and a heat sink in order to protect overlying skin.

Energy is generally delivered in continuous mode.

The amount of energy delivered can be varied by adjusting the pullback speed and/or power in order to individualize treatment based on vein size. Various wavelengths are in use, including 810, 940, 980,1320 and 1470. There are no well-done comparative trials assessing both post-op recovery and long-term efficacy. The proper amount of energy delivered may vary based on wavelength utilized.

Using a laser fiber with a modified *vs.* bare tip may reduce vein perforation and postoperative pain. However, there are no good comparative studies available.

As with all EVLA procedures, assessment using duplex ultrasound in order to verify proper vein placement, use of adequate tumescent anesthesia, and verification of removal of an intact guidewire, catheter and fiber is critical to its safe and effective use.

The usual post-operative care is advised following treatment of "other veins", including immediate ambulation and bandages and/or medical compression stockings, avoidance of heavy lifting, hot baths and long travel for one week.

Many physicians perform **duplex ultrasound follow-up** within one week after EVLA, although the cost effectiveness of this is questionable.

Complications

Adverse sequelae of EVLA, ecchymoses and pain, are usually mild and transient.

More significant but uncommon complications include infection, skin burns, paresthesia, and superficial and/or deep vein thrombosis.

There is no evidence that EVLA treatment of "other veins" results in a higher or lower risk of complications compared to treatment of the GSV.

Conclusions

Endovenous laser ablation (EVLA) has been used to ablate GSV, SSV, AASV, PASV, anterior and post circumflex, thigh extension of the SSV including Giacomini, and long/straight incompetent tributary veins in patients who are obese.

It is well-established for the treatment of GSV reflux, and is a reasonable first-line treatment of other incompetent subsurface veins although larger series with longer follow-up and clinically relevant outcomes would be useful to more fully understand its risks and benefits in these settings.

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