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Endovenous laser ablation – Indications.

Les indications de l'ablation par laser endoveineux (ALE) dans la maladie variqueuse.

van den Bos R.

Summary

Endovenous laser ablation is a minimally invasive treatment for varicose veins.
It can be performed in an outpatient setting using tumescent anaesthesia.
It has a very high efficacy and an excellent side-effect profile.
Endovenous laser ablation is mostly performed in primary incompetent great and small saphenous veins, but can also be used to treat accessory saphenous veins, tributaries, perforator veins and sometimes even in patients with venous malformation.

Keywords: *indications, endovenous laser ablation, thermal ablation, varicose veins.*

Résumé

L'ablation par laser endoveineux (ALE) est un traitement mini-invasif de la maladie variqueuse.
Ce traitement peut être réalisé en ambulatoire sous anesthésie locale par tumescence.
Il a une très grande efficacité et un très faible taux d'effets secondaires.
L'ALE est le plus souvent réalisée pour les incontinences tronculaires de la grande veine saphène et de la petite veine saphène, mais elle peut concerner le traitement des veines saphènes accessoires, des veines tributaires, des veines perforantes et même, dans certains cas, des malformations veineuses.

Mots-clés : indications, ablation par laser endoveineux, ablation thermique, veines variqueuses.

Introduction

Before thinking about the practical feasibility of endovenous laser ablation (EVLA) at all, the physician needs to take many other issues into account.

The patient's complaints, symptoms, the results from clinical and duplex ultrasound findings, the general health of the patient, patient preferences, the aim and success rate of the treatment should all be evaluated.

The importance of pre-operative duplex ultrasound examination cannot be overemphasized.

It is used to determine the anatomical and hemodynamic characteristics of the patient's venous system.

And it allows evaluating the relation between symptoms of venous disease and the pathologic findings, and treatment plans to be formulated.

When having considered all these aspects, the most eligible treatment should depend on different characteristics of the patient and the vein to be treated.

A review by ***Ash et al.*** listed indications for intervention in primary venous insufficiency that includes treatment or prevention of complications arising from chronic venous hypertension.

The following treatment indications were listed: general appearance, aching pain, leg heaviness, easy leg fatigue, superficial thrombophlebitis, external bleeding, ankle hyperpigmentation, lipodermatosclerosis, atrophie blanche and venous ulcer [1].

All endovenous ablation treatments have in common that they can be performed under local tumescent anesthesia.

Endovenous treatments have also in common that the vein to be treated needs to be catheterized.

An advantage of EVLA is that the amount of administered energy can be varied. By adjusting the pullback speed, the power, or both, the total amount of delivered energy per centimetre can be influenced.

For small veins only 20 J/cm can be used, whereas higher energy (*i.e.* 60 J/cm) can be used when treating large veins.

With EVLA, every segment can be treated with lower or higher energy, which may be useful when treating veins that have a variable diameter.

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Indications of EVLA for saphenous veins

The most common indication for EVLA is great saphenous vein (GSV) with or without sapheno-femoral junction (SFJ) insufficiency, measured by duplex ultrasound examination and clinical presentation ("Clinical" stadium 2 to 6 of the CEAP classification).

The second most frequently treated vein is the small saphenous vein (SSV).

Both great and small saphenous veins, especially when they have primary insufficiency, have a linear tract in the fascial compartment, usually with a diameter of 4-5 mm or more.

Because of the rigidity of the disposables, these linear, relatively large veins are ideal for EVLA.

Many reports have described the successful treatment of both great and small saphenous veins [2, 3, 4, 5].

Veins that had a previous superficial phlebitis or were previously treated with foam sclerotherapy can also be treated with EVLA, but one should be very careful as introducing the laser may be difficult and there might be an elevated risk of embolic events due to the intravascular trabeculation.

Sometimes it is needed to treat the vein in different parts, because the fibrotic tissue inside the vein may make it impossible to introduce the guide wire or catheter.

Trabeculation may cause the guidewire to be blocked and not be able to be pushed forward; in that case the vein can be punctured again above the obstruction to treat the next part of the vein.

Indications of EVLA for the accessory veins

Endovenous laser ablation can also be used for ablation of the anterior accessory saphenous vein or the posterior accessory saphenous vein [6].

The accessory vein can be treated either alone or together with an incompetent GSV. A relatively straight segment is needed for EVLA, sometimes additional phlebectomies are required to treat the tortuous parts of the accessory vein.

When the accessory vein leaves the fascia compartment (and thus becomes a tributary) administration of tumescent is slightly more difficult.

The tumescent anesthesia diffuses easily and should therefore be administered excessively just before the actual laser treatment.

Indications of EVLA for perforator veins

The treatment of perforator veins can be challenging.

Although incompetent perforator veins have been described an important role in the pathophysiology of advanced venous hypertension and may be especially important in venous ulcer patients, their treatment remains a somewhat ***controversial subject***.

The anatomic characteristics of perforator veins make their treatment complicated. Perforator veins connect the superficial with the deep venous system and traverse fascial spaces.

Paired small arteries are located very close to these veins.

Also, quite often pathologic perforator veins are located in ***lipodermatosclerotic tissue*** (fibrotic tissue or even calcification) at the medial calf which makes percutaneous entry at that point difficult [7].

Puncturing with a small needle is advisable and a skin incision should be avoided because of impaired wound healing in the fibrotic area. Because of the close proximity of the arteries, caution is indicated.

It can be difficult to administer enough tumescent anesthesia around the perforator vein, and therefore the artery may be separated insufficiently from the vein to be treated.

The risk of injury to the artery and nerve is therefore present.

Damage to the artery may induce skin necrosis, and damage to the nerve may lead to paresthesia.

Because the tumescent anesthesia may be difficult to administer, especially in areas with severe lipodermatosclerosis, patients may experience pain during endovenous ablation.

Proebstle described endovenous laser ablation of perforator veins with good results [8], but other case-series (also of radiofrequency ablation), report less successful results, due to reopening of the treated segment after relatively short follow-up time, or to a learning curve for the procedure [9].

Indications of EVLA for venous malformations and Klippel-Trenaunay syndrome

Venous malformations (VMs) are high-volume, low-flow lesions with large diameter vessels and draining veins [10].

They can lead to multiple complaints and complications such as pain, bleeding, consumptive coagulopathy, reduced range of movement, non-healing ulcers and cosmetic disturbance [11].

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Treatment of VMs is difficult:

- Sclerotherapy with polidocanol foam can be used but may lead to reopening.

  Also sclerotherapy with ethanol and sodium tetradecyl sulfate has been described as successful treatment for VMs [12, 13].
- Surgery is often difficult, because the lesions are diffuse or difficult to access, surgery may therefore be incomplete and lead to major bleeding.
- Endovenous laser ablation can be used [14], but only for the parts of the VM that is visible with ultrasound guidance and that can be surrounded safely with tumescent anesthesia.

Often, only parts of the VM can be cannulated and treated.

After EVLA, additional parts may be treated with foam sclerotherapy.

Lu et al. reported EVLA of 38 patients with a VM.

In 17 patients the VM was located on the lower extremity; the others were on the arm, back, chest or shoulder.

All patients reported reduction of pain and in two thirds of the patients the VM reduced in size after a mean follow-up of 1 year [11].

- ***Klippel-Trenaunay syndrome (KTS) is a mixed vascular malformation characterized by the clinical triad of capillary malformations, soft tissue and bone hypertrophy of a limb and atypical mostly lateral varicosities.***

Deep venous anomaly and valve hypoplasia or aplasia have also been described in KTS patients.

As multiple organs are usually involved, a multidisciplinary approach for the diagnosis and treatment of KTS patients is indicated.

The lateral marginal vein is the most typical persisting embryonic vein, it originates at the lateral aspect of the foot and runs along the lateral side of the leg and its drainage is usually in a branch of the deep femoral vein or through gluteal veins, or directly into the internal iliac vein.

The marginal lateral vein is usually located quite superficially and due to the absence of valves always incompetent.

The marginal lateral vein could be treated with EVLA in patients with KTS who have complaints of this vein, but only when the deep venous system is normal and blood drainage is not dependable from the marginal lateral vein [15, 16].

There are publications of surgical resection of the marginal vein, but there are no publications on EVLA of marginal veins yet.

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