Closure® and endovenous laser treatment (EVLT) are tools such as the PIN stripper, allowing the elimination of a straight venous portion between 2 points. These are alternative options to stripping. The first of these techniques to have been published, EVLT, uses laser; the second one, which has been the subject of numerous comparative or randomized studies, uses the Closure® catheter (radio-frequency thermal obliteration). Finally, a third technique uses foam sclerotherapy with a long catheter (FSLC). These 4 techniques are different, and it should be possible to define precise indications for each of them. If we compare the efficacy, stripping (which removes the trunk immediately and definitely) comes first, followed by Closure® (which makes the trunk disappear 2 to 4 months later in more than 90% of cases), EVLT, and finally FSLC. Comparing the aggressiveness, stripping comes first, followed by EVLT (which generates more haematomas and inflammatory reactions than Closure®), then Closure®, and finally FSLC (which does not usually leave any cutaneous marks). The less aggressive the technique, the quicker the patient's recovery. A randomized study has demonstrated that Closure® is more effective than invagination regarding quality of life and morbidity.

Comparing the complexity of the technique, it is obvious that Closure® is the most extensive, followed by EVLT (which is quicker and simpler), then stripping and finally FSLC which is clearly the simplest one.

If we compare the cost (in France), the least expensive technique for patients is FSLC, followed by stripping under ambulatory local anaesthesia, EVLT, and finally Closure®. Stripping requires significantly longer postoperative sick leave than does Closure®. In Finland, if duration of sick leave is taken into account, Closure® is less expensive than stripping. Because of the differences between these techniques, the choice of a technique must take into account the possibility of using an alternative technique to make up for possible unsatisfactory results. Indications are discussed below.

Closure® is ideal for the removal of the great saphenous vein between the saphenofemoral junction and below the knee with a diameter of < 12 mm. Closure® at thigh level is clearly the best technique because of the lack of haematomas and inflammatory reactions.

Since a guide wire can be used with EVLT and Closure®, the possible difficulties to overcome with tortuous veins are the same for both methods. However, the laser fibre will be easier to use in cases where the difference in diameter along a trunk is too great (which could require 2 types of Closure® catheter) or in cases of an aneurism. With Closure®, the deep thermal penetration into the venous wall can be risky at calf level and for the small saphenous vein where the saphenous nerves are close to the trunk. In contrast, EVLT can be used because laser burn due to blood boiling affects the endothelium without a significant transparietal effect.

With respect to truncal saphenous insufficiency fed by perineal veins, the best upper solution is to introduce a catheter from the bottom up and to inject a foam sclerosing agent at the upper part of the catheter before the procedure to obtain the best sclerosis of the perineal veins from the bottom up.
The same anatomical pattern can be found in the truncal insufficiencies fed by thigh perforators that are long, thin, tortuous, and surgically impossible to reach. A foam injection at the upper part of the trunk enables the treatment of the perforator at the same time. Trunk compression may even orientate foam progression beyond the catheter extremity to a perforator or collateral. However, if the thigh perforator is voluminous and has a significant flow, EVLT is certainly more appropriate because of exsanguination difficulties. In case of redo surgery, the removal of incompetent residual trunks of the thigh is a tricky surgical problem that sometimes cannot be solved because of the traumatic perioperative risks. For these anatomical cases, endovascular obliteration is a blessing. The insertion of a catheter from the bottom up and blocked at the upper part of the residual trunk enables the injection of sclerosing foam up to the lymph node veins or into the small varicose veins that connect the deep femoral venous system with the residual trunk. In obese patients, the removal of a deep and voluminous trunk is often an indication for EVLT rather than Closure® because exsanguination is not so easy to perform in those patients. In addition, EVLT's haematomas resulting from extravasation are less visible owing to the cutaneous thickness. Contrary to comments made when Closure® was first used on the trunks located subcutaneously, tumescent anaesthesia prevents cutaneous burns. In fact, Closure® seems to be a good indication for these anatomical patterns because EVLT and FSLC cause postoperative cutaneous pigmentation fairly often.

For patients receiving anticoagulant treatment or for those wanting to be operated on in the summer, a technique that generates fewer haematomas, such as Closure®, should be considered. When it is necessary to have very precise starting and arrival points for a trunk removal (originating on an insufficient tributary and finishing under a re-entry perforator), Closure® is certainly the most precise technique. It allows starting the procedure up to about 1 mm below the ostial valve.

When the absence of any traumatism in the area surrounding the treated trunk is required, FSLC is the most appropriate technique. EVLT, with possible perforations, may damage lymphatic vessels, causing lymphoedema, and therefore seems less appropriate than Closure®. Because exsanguination is difficult to perform in areas with numerous venous connections, perforators, and varicose collateral veins, EVLT and FSLC can be more efficient in cases with leg trophic changes.

The general indications are shown in the Table.

Neurological risks at the calf level and for the small saphenous vein proscribe the use of Closure® for these locations. Closure® is the most precise technique on the trunk, but, unlike ELVT, it requires perfect exsanguination. Finally, unlike Closure®, the diameter of the trunk to be treated is not limited with ELVT and FSLC.

**Table I: Comparison of the anatomical elements for choosing the best technique.**

<table>
<thead>
<tr>
<th></th>
<th>Closure®</th>
<th>EVLT</th>
<th>FSLC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurological risks for calf</td>
<td>high</td>
<td>Moderate</td>
<td>null</td>
</tr>
</tbody>
</table>
GSV (calf) and SSV

<table>
<thead>
<tr>
<th>Precision of occlusion</th>
<th>High</th>
<th>Moderate</th>
<th>Poor</th>
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</thead>
<tbody>
<tr>
<td>Exsanguination</td>
<td>Yes</td>
<td>No</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Diameter of the trunk (mm)</td>
<td>2-12</td>
<td>No limits</td>
<td>&lt; 10</td>
</tr>
</tbody>
</table>

EVLT = endovenous laser treatment; FSLC = foam sclerotherapy with a long catheter; GSV = great saphenous vein; SSV = small saphenous vein.

REFERENCES