

# Laser surgery in venous insufficiency: E.L.A.V.<sup>TM</sup> personal technique

*Cirurgia a laser no tratamento da insuficiência venosa:  
E.L.A.V., o desenvolvimento de uma nova técnica*

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## Abstract

**Objectives:** To show our experience in the treatment of varicose veins with a newly developed laser treatment technique: E.L.A.V.<sup>TM</sup> (Endo Laser Ablation Veins), a novel application of laser in venous insufficiency pathology.

**Method:** We have created a new application that consists of the treatment of either long or short saphenous veins. It is also possible to treat both legs at the same time associating miniphlebectomies and transdermic laser treatment of all small varicosities, if necessary. Duplex scanning evaluation was undertaken in every patient so that it provided the causes of venous insufficiency and the highest point of reflux. It was an accurate and individualized duplex scanning study.

**Results:** Patients treated with E.L.A.V.<sup>TM</sup> method presented excellent occlusion postoperative rate, low morbidity and underwent a more comfortable postoperative.

**Conclusion:** E.L.A.V.<sup>TM</sup> method applied by an expert vascular surgeon becomes a valid alternative to conventional surgery of varicose veins.

**Key words:** laser surgery, varicose veins.

## Resumo

**Objetivos:** Apresentar uma experiência no tratamento de varizes com uma técnica a laser desenvolvida pelos autores: E.L.A.V.<sup>TM</sup> (*Endo Laser Ablation Veins*), que constitui uma nova aplicação do laser na patologia de insuficiência venosa.

**Método:** Criamos uma nova aplicação que consiste no tratamento tanto da veia safena magna como da parva. É possível também tratar ambos membros ao mesmo tempo associando, se necessário, miniflebotomias e tratamento de laser transdérmico de pequenas varicoses. Todos os pacientes foram submetidos a avaliação com *duplex scan* para obtenção das causas da doença venosa e do maior ponto de refluxo. Um estudo preciso e individualizado de cada paciente foi realizado com o *duplex scan*.

**Resultados:** Pacientes tratados com o método E.L.A.V.<sup>TM</sup> apresentam excelente taxa de oclusão pós-operatória, baixa morbidade e um pós-operatório mais confortável.

**Conclusão:** O método E.L.A.V.<sup>TM</sup> aplicado por um cirurgião vascular experiente é uma alternativa válida para a cirurgia vascular de veias varicosas.

**Palavras-chave:** cirurgia a laser, varizes.

Since 1996, our team has been analyzing closely the works published about minimally invasive treatment of varicose veins. Radiofrequency, angioscope, subfascial ligatures and endovenous laser treatment are of special interest for us because they are sophisticated techniques with important effects on the hemodynamics. Yet, they avoid the inconvenient postoperative of the classic techniques.<sup>1-3</sup>

In the present article, we show the results of a 24-month analysis of 295 patients managed with the E.L.A.V.<sup>TM</sup> technique, in a private hospital.

## Material and methods

All patients were approached in the operating room and submitted to regional anesthesia. After surgery they were not hospitalized. Diodo laser Diomed<sup>TM</sup> with 810 nm and 15 W was used in all patients (approved by FDA in 1996 and CE in 1999).

All patients included in the study belonged to C2-C6 of CEAP classification and were studied by

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eco-Doppler. They had long or short saphenous reflux with or without varicose veins and were uni- or bilaterally approached, if needed. The highest diameter of long saphenous vein was 16 mm. Patients did not present any signs of deep venous thrombosis (DVT) and, after operation, showed long or short saphenous reflux under Valsalva maneuvers. We operated all the saphenous veins with diameters between 4.5 and 16mm and reflux.

Pregnant patients, with DVT, saphenous diameter > 16 mm and with saphenoctomy were not included in this study.

All patients were given an information sheet with a precise explanation of the different techniques that could be employed to their case.

From October 2002 to October 2003 we operated 295 patients with the E.L.A.V.<sup>TM</sup> technique: 182 unilateral long saphenous; 71 bilateral long saphenous; 27 unilateral short saphenous; three bilateral short saphenous and 12 long and short saphenous. In all of them, Müller phleboextraction was associated.

All patients were submitted to duplex scanning evaluation so that the reflux origin (saphenofemoral junction versus pelvic veins) and the start and end points of reflux (Figure 1) could be determined.



Figure 1 - Duplex scan mapping.

#### ***Description of the technique: E.L.A.V.<sup>TM</sup>***

The patients were submitted to regional anesthesia in cases of bilateral or severe venous insufficiency. The insufficient saphenous vein was catheterized through a small incision. A guide wire was entered through it and 5 French catheter was passed up to the saphenofemoral junction. We used a 400 or 600 m optic fiber. Laser was applied to the entire extension of the saphenous vein (Figure 2). Shunt types 1 and 3 (insufficiency or not of saphenofemoral junction) were treated with ligation of insufficient saphenofemoral junction and its collaterals (Figure 3). In shunt types 2 and 4 this procedure was not necessary. The catheter was placed 2 cm below the saphenofemoral junction (duplex scan guided position). 810 nm laser energy were liberated, with 12-14 watts, one second duration and 0.5 seconds between shoots (Figure 4).<sup>4-7</sup>

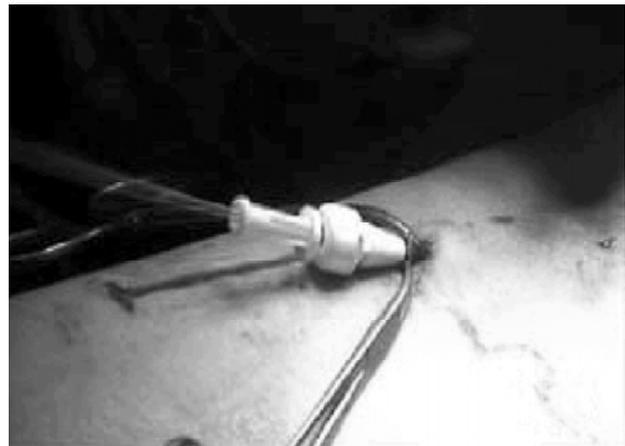


Figure 2 - Catheterization of the long saphenous vein (middle 1/3 leg).

A total of 80-110 pulses were needed in every leg, depending on the length of the treated vein (Figure 4).<sup>4,5,7</sup> Müller phlebectomy was made in the varicose veins (Figure 5) and transdermic laser treatment was applied to the small varicosities, telangiectases and reticular varicose veins if needed. After cleaning the leg, a sterile dressing is applied to the incisions and an elastic bandage must be used during 48 hours. After that, stockings must be worn for 4 more days.



**Figure 3 -** Saphenofemoral junction ligature.



**Figure 4 -** Laser procedure.

Prophylactic heparinization (low molecular weight heparin) and antibiotic therapy were used in all patients to prevent DVT and infections because the next medical control would not be before 48 hours after the procedure.

Hemodynamic control study by duplex scanning was carried out after 48 hours, 8 days, 1, 3, 6 and 12 months. Elastic stocking support was required for no more than 15 days.



**Figure 5 -** Muller phlebectomies.

## Results

Immediate results were considered to be within 1 month after the procedure. They were: absence of burnings, cellulites, paresthesias or thrombosis; hematomas were found only in cases of phlebectomy. There were two cases of incomplete occlusion portions of the long saphenous vein combined with correct occlusion of the rest. No important postoperative pain (no need of major analgesic therapy) was reported.

Patients came back to their normal routine in 72 hours (average).

Late results were: 5% Periphlebitis (cellulites) successfully treated with diclofenaco, 1.3% of partial asymptomatic revascularization of the long saphenous vein, one total revascularization in a patient with a big hematoma in the thigh, 48 hours postoperative probably because extravasations of the laser fiber, two cases with partial long saphenous vein reflux, none in short, and 0.6% cases of low paresthesia in short saphenous vein treatment, all of them transitory.

## Discussion

E.L.A.V.<sup>TM</sup> is able to treat venous insufficiency and varicose veins uni- or bilaterally in an ambulatory procedure that is really comfortable for the patient.<sup>8</sup>

In case of saphenofemoral junction insufficiency, its ligation has no recidives nor neoangiogenesis in our experience.

Under regional anesthesia we were able to treat global insufficient saphenous veins, uni- or bilaterally, associating long phlebectomies, all at one time in an operating room and with optimal surgical conditions.

The use of this laser method does not require tumescence anesthesia because no injuries presented in the proximal structures.

It offers non-systemic complications and the locals are clean and easily treated.

Phlebectomy of varicose veins, telangiectasis and varicosities transdermic laser treatment provide a very aesthetical result that satisfies patients, both man and woman.

Only longer series and prospective studies can really tell us the function and applicability of this new technique as it happens with other new procedures.

Finally, in our opinion, laser surgery must be applied in an individualized hemodynamic study by a specialist in vascular surgery who has the appropriate knowledge on these techniques and of course it must take place in an adequate atmosphere and operating room. Revascularizations are probably due to an incorrect application of the laser method.

Laser treatment E.L.A.V.<sup>TM</sup> gives us the opportunity to heal without harm; it includes a very trustful technique with both hemodynamic and aesthetic good results.<sup>9-13</sup>

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