

# Stripping Saphenectomy, CHIVA and Laser ablation for the treatment of the Saphenous vein insufficiency

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## Abstract

**Aim:** To analyze the results of three different techniques for the treatment of the great saphenous vein insufficiency as the main cause of varicose veins.

**Methods:** We analyze three groups (Stripping, CHIVA I and Endovenous Laser ablation) with 40 patients each. Follow up was done at 1, 3, 9 and 12 months.

**Keywords:** Varicose veins, Saphenectomy, Endovenous Laser ablation, CHIVA (Cure Haemodynamic Insufficiency Venous Ambulatory), Ambulatory surgery.

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**Results:** The CHIVA and laser ablation had the best aesthetic result and fewer discomfort, but laser ablation had higher economic cost. There was no recurrence after 1 year in any of the groups.

**Conclusions:** The three techniques proved very good results for the saphenous insufficiency treatment.

## Introduction

Since Babcock [1] described and improved the saphenectomy stripping technique in 1907, there have been small changes in the surgical technique, except for the following:

The local phlebectomy described by Robert Müller in 1966 [2], CHIVA technique (Cure Hémodynamique de l'Insuffisance Veineuse en Ambulatoire), studied by Franceschi [3] in 1988, with the use of a meticulous preoperative Duplex examination; the invagination saphenectomy described by Creton in 1989 [4, 5], and finally, the revolutionary endovenous laser ablation technique developed by the Spanish doctor Bone in 1999 [6].

The development of varicose veins due to great saphenous vein (GSV) insufficiency from the sapheno-femoral junction (SFJ) represents one of the most frequent causes of varicose veins - type 1 shunt-.

The need of progression to less invasive types of surgeries, with small admission time, has lead to a progress where currently most varicose vein treatments are achieved ambulatory [7].

Varicose veins need dedication and suppose a great diagnostic and therapeutic occupation time in any Angiology and Vascular surgery unit. It has become an important source of sanitary cost due to the great demand by patients and to the high prevalence of the pathology. Probably, if preventive measures were applied and carried out by patients, there would be a decrease in the associated morbidity.

The basic indication (both medical and surgical) for the treatment of varicose veins is the prevention of possible complications and sequels. Another increasingly demanded indication is the aesthetic one, which should be reevaluated by the sanitary councils. Therefore, varicose vein surgery is basically a preventive surgery.

## Materials and methods

The purpose of our study is to prospectively analyze the results of three different techniques used for the treatment of the great saphenous vein insufficiency, originated at the sapheno-femoral junction (type 1 shunt), as the main cause of varicose veins in 120 patients.

The technique to be used in each case was assigned as decided by the patient, based on the information received:

1. **Saphenous stripping.** Still the gold standard, with a big acknowledgement of the technique, more definitive but the most aggressive of the three.
2. **CHIVA I (Cure Hémodynamique de l'Insuffisance Veineuse en Ambulatoire).** The most physiological one. Conservative and less traumatic, with occasional recurrences.
3. **Endovenous Laser Ablation.** The most modern and therefore with less experience. More aesthetic and expensive, but less traumatic.

Patients included had to fulfill the following Inclusion criteria:

- Greater saphenous vein (GSV) and its sapheno-femoral junction (SFJ) with diameter under 10 mm.
- Clinical classification CEAP C2-C3.
- Always achieved by the same two surgeons and with the same criteria.

There were no age or weight limits and all patients were described after preanesthesia evaluation as ASA type I or II. Patients were added to each group until a 40 member group was set up. All patients were given informed consent.

During the first clinic consultation, a varicose vein "mapping" analysis, with all possible reflux, leaks and reentries was achieved with a portable eco-doppler. The same surgeon would repeat this Doppler

examination just before entering the operating theatre. Those treated with endovenous laser ablation would undergo examination during surgery with the CDU (Color Doppler Ultrasound) for a more exact location of the optical-fiber at the sapheno-femoral junction.

In the CHIVA technique, apart from the ligation of the saphenofemoral junction (SFJ), a 2-4 cm fragment of the SFJ would be removed to avoid saphenous vein neovascularization.

The laser used was Long-Pulsed 810 nm Laser Diode, using 600 micron fibers, introduced by transcutaneous malleolus puncture or otherwise after small internal malleolus dissection.

Varicose veins dependent on R3 system were treated with the Müller stab avulsion method.

Following our Mayor Ambulatory Surgery Unit protocol, all patients were operated under intravenous total anesthesia with the use of laryngeal masks.

Following the protocol for postoperative venous thromboembolism prophylaxis, all patients were treated with Low-Molecular-Weight-Heparin. All patients were given a written report with basic advices (identical in all cases) and with an analgesic guideline for the first postoperative week.

There was never an indication for complete bed rest, but we recommended frequent deambulation from the day of surgery, with temporary rest with feet elevation just when required for discomfort relief. Patients could walk out of home from the first postoperative day.

The standard follow up was achieved with physical examination and CDU (Color Doppler ultrasound) exploration at 15, 30, 90, 180 and 360 days after surgery, with evaluation of the following:

1. Three different degrees of haematoma.
2. Subjective postoperative pain perception, both in duration time and severity (measured in a scale from 1 to 10).
3. Their expectations in terms of surgical aesthetic results.

These parameters were statistically evaluated with the Pearson's Chi-square Test, and organized in contingency tables for independent nonparametric variables.

## Results

The median age was very similar in all groups. Both women and young people preferred the endovenous laser ablation technique, whereas men and older people preferred the saphenectomy stripping technique.

Varicose veins were removed in all cases, using the Müller stab avulsion method for all patients (Table 1), though we used crochet hooks instead of those created by Müller.

As the anesthesia method was the same in all patients, the postoperative admission time was similar in the three groups, which was in all cases under 6 hours; all patients were discharged with normal spontaneous deambulation with an elastic bandage or compression stockings.

Postoperative discomfort was subjectively evaluated by patients following a scale from 1 to 10. Discomfort was surprisingly lower for those treated with endovenous laser ablation (initially only 12.5%, and of low severity in all cases); there was a high incidence of discomfort for those who underwent saphenectomy stripping, 67.5%, and also a 30% of cases suffering discomfort in those treated with CHIVA method. After 1 year follow up, and beginning practically from the first medical checkup, only 1 patient treated with laser had significant pain discomfort. None of those treated with CHIVA ( $p < 0.05$ ) had significant pain discomfort. Those treated with stripping saphenectomy presented a 5% discomfort pain at 1 year follow up, with severity ranging from level 3 to 7.

There was no incidence of neuritis due to nerve avulsion. We had also no incidence of saphenous neuritis in those treated with endovenous laser and obviously neither in those treated with CHIVA.

72.5% of those treated by stripping saphenectomy had some degree of haematoma, especially

at thigh level. Obviously none of those treated with CHIVA had haematoma and up to 47.5% of those patients treated with laser ablation developed haematoma, also at thigh level in the great saphenous vein territory ( $p < 0.05$ ), but with very slight pain. Only one patient of those treated with laser ablation developed, during the first 15 postoperative days, a very significant painful haematoma.

There was an 87.5% great saphenous vein patency for those patients treated by means of CHIVA technique, with mild reflux and only of orthostatic initiation. Up to 67.5% of these had a significant diminish of the great saphenous vein diameter at one year follow up.

**Table 1** General results of the three studied groups.

	STRIPPING	CHIVA	LASER
Mean Age	57.4	56.2	51.9
Female/Male	15/25	22/18	30/10
Efficiency Saph.Insuf.Treat	100%	100%	100%
PostOp.Discomfort >5 (1-10)	27 (67.5%)	12 (30%)	5 (12.5%) $p < 0.05$
Haematoma	29 (72.5%)	-	19 (47.5%) $p < 0.05$
Saphenous Patency (or segments)	-	35 (87.5%)	2 (5%)
Saphenous Diameter Decrease	-	27 (67.5%)	-
Cost	-	<-	->>>
Satisfaction >7 (1-10)	80%	85%	95%
Neuritis	0	0	0
DVT	0	0	0

Up to 5% of those patients treated with laser ablation showed saphenous patency in some segments, without haemodynamic reflux reperfusion in those segments.

There was no evidence of deep vein thrombosis (DVT) in any of the three groups.

The economic cost (only restricted to the surgical technique) was at least 5 times higher in those treated with endovenous laser ablation.

## Discussion

Idiopathic great saphenous vein insufficiency as the cause of varicose veins represents the most frequent vascular pathology. Due to its broad demand, waiting list and sanitary cost, it requires a well-organized diagnostic and therapeutic strategy.

The limited clinic reperfusion in its first stages makes it difficult to begin the treatment in these stages where evolution of the pathology and morbidity could be significantly diminished.

Varicose veins have two main conditions of social interest:

1. The clinical reperfusion when not treated.
2. The aesthetic aspect, being unattractive for patients in many circumstances, leading to rejection by others, which can even have a psychological effect on them.

The economic cost of this pathology for the health system can be quite high, but it is believed that operating in early stages of the pathology can compensate the subsequent higher economic cost of possible sequels and complications [8].

There is clear data on the benefit of surgical treatment versus clinical and conservative treatment of varicose veins [9–13].

Surgical treatment for varicose veins had a great and creative improvement with Muller's invention of the local stab avulsion method, developing those useful hooks which are probably still the best ones after 30 years. His pioneering creation can even avoid suturing the surgical incisions [2]. Soon after came Franceschi, who developed a minimally invasive surgical approach (CHIVA) aimed to a haemodynamic correction, more than to a radical avulsion of the varicose bed, based upon a meticulous preoperative Duplex examination. Although this preoperative study might be complicated in some cases, the result is an efficient, cheap and ambulatory minimally invasive surgery [3].

This technique, which has been worldwide diffused in the last years, has caused in some cases an incorrect study of the patients, with the subsequent worse results, possibly due to the large number of patients who desire a fast and cheap treatment. Better results will arise when the preoperative study is performed more meticulously, in a more professional way, with a correct preoperative, (both diagnostic and surgical) assessment [14, 15].

The excess of surgical indications and performances of CHIVA has lead to some disappointing, but probably unreasonable, results of this technique [13].

There is no doubt for those who have seen or performed saphenectomy, that it is a traumatic technique. For that reason Creton presented his wide casuistry of invaginated axial saphenectomy, with local anesthesia and on an ambulatory basis in most cases [5].

Saphenectomy is still today the gold standard for comparative studies of whatever other technique which wants to evaluate its results on eliminating the immediate cause (reflux or insufficiency) of varicosities [12, 16, 17].

Endovenous laser fulguration, which was created and developed by Bone and later diffused by Min [18], has experienced a great breakthrough. The laser used in our patients was Long-Pulsed 810 nm Laser Diode, using 600 micron fibers. All of our patients treated with this technique had an excellent result, as only small diameter GSV were selected. Currently, better devices with greater wavelengths might be required for bigger saphenous veins [6–19].

Different studies, with very similar results, provide comparative data regarding effectiveness depending on the technique used. All of these studies compare their results with the saphenectomy technique [22–24]. There must still be defined, with bigger series, the economic cost and endovenous laser indications [24, 25], deciding moreover when and which technique should be used [22, 26, 27].

As seen by many other authors, we have observed a great improvement in the recovery after surgery, with complete postoperative periods ranging from 7 to 30 days with the two less aggressive techniques, CHIVA and laser technique. It is of great interest with the laser technique that, although there is an extensive area treated, during the postoperative there is very slight pain. Moreover, not performing the two basic incisions used in the CHIVA (the inguinal one and the lower limb one) is already an important breakthrough of the laser technique [24, 25, 26].

In conclusion, the techniques used have proved very similar results, with different economical costs and, for those treated with CHIVA and laser, clinical improvement in the early postoperative period.

Larger prospective randomized studies with long-term follow-up are necessary to compare the three techniques and decide which treatment will be more suitable for each patient.

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