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**Original Research Article**

# Retrospective review of endovenous thermic ablation alone versus combined with phlebectomy in the management of varicose veins

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## ABSTRACT

**Background:** Chronic venous disease (CVD) affects 25-30% of the adult population in developed countries, significantly impacting quality of life. Endovenous thermal ablation (EVTA) has replaced traditional saphenectomy, but the benefit of combining it with phlebectomy remains debated. This retrospective study compares varicose vein recurrence after EVTA with and without phlebectomy.
**Methods:** A total of 155 patients from the general hospital of Mexico between 2021 and 2024, classified as CEAP C2-C6, were analyzed. Of these, 83 underwent EVTA with phlebectomy, and 72 underwent only EVTA. Demographic data were analyzed, and recurrence rates, technical success, and complications were compared using chi-square and student's t tests ($p<0.05$).
**Results:** Recurrence rates were lower in the phlebectomy group (14.5%) compared to the non-phlebectomy group (27.2%, $p=0.04$). The success rate was higher in the phlebectomy group (86.7%) compared to EVTA alone (65.2%, $p=0.003$). There were no significant differences in complications between the groups.
**Conclusions:** EVTA with phlebectomy demonstrated better outcomes in terms of recurrence and clinical success. However, minor complications such as bruising should be considered when choosing the treatment.

**Keywords:** CVD, Endovenous ablation, Phlebectomy, Varicose veins, Recurrence

## INTRODUCTION

Chronic venous disease (CVD) is a common condition, which can progress to affect nearly one-third of the adult population in developed countries, significantly impacting quality of life.[1,2] Symptoms vary, ranging from asymptomatic cases with the presence of telangiectasias and reticular veins, to edema, heaviness, skin discoloration changes such as lipodermatosclerosis, and the presence of ulcers (Figure 1).[3,4] Controlling underlying venous insufficiency is essential to prevent disease progression and, more importantly, to reduce the likelihood of complications.[5]

Over the past two decades, EVTA has largely replaced traditional saphenectomy as the first-line treatment for saphenous vein insufficiency.[6,7] EVTA, which includes both endovenous laser ablation (EVLA) and radiofrequency ablation (RFA), has demonstrated high success rates, with long-term venous occlusion in over 90% of cases, and fewer complications compared to conventional surgery.[8,9] These procedures minimize postoperative pain and recovery time, making them preferred by both patients and clinicians.[10]

An important question in the management of CVD is whether concomitant phlebectomy improves the outcomes of EVTA.[11] Phlebectomy, a procedure that removes visible varicose veins through small incisions,

can be performed during EVTA to treat superficial tributary veins that cannot be fully addressed with endovenous treatment.[12,13] While some studies have shown that concomitant phlebectomy improves aesthetic and clinical outcomes, others suggest that sclerotherapy may be equally effective in treating residual veins post-EVTA, avoiding the need for additional incisions.[14,15]

**Figure 1: A limb with advanced CVD.**
It primarily characterized by the presence of an active ulcer, accompanied by skin changes such as hyperpigmentation and lipodermatosclerosis.

The debate over the necessity of concomitant phlebectomy is partly driven by the evolution of minimally invasive treatment techniques. Several studies have documented that phlebectomy does not provide significant additional clinical benefits when combined with EVTA, while other reports suggest that it reduces the recurrence of visible varicose veins.[16,17] However, complication rates such as hematomas, postoperative pain, and scarring are concerns that may influence the decision to perform concomitant phlebectomy.[18,19]

This retrospective study aims to compare the recurrence of varicose veins following EVTA with and without concomitant phlebectomy in CVD patients one year after the procedure. Treatment success rates, varicose vein recurrence, and complications will be evaluated using a sample of cases treated at our center over a three-year period. This analysis will contribute to the discussion on whether concomitant phlebectomy offers a significant additional clinical benefit in the treatment of CVD.[20]

## METHODS

This clinical investigation is a retrospective, quantitative, cross-sectional study with an analytical, correlational design. It includes patients with CVD who had no prior surgical treatment and underwent endovascular thermal ablation at the general hospital of Mexico "Dr. Eduardo Liceaga" between 2021 and 2024. A total of 882 patient records were analyzed, of which 727 were excluded based on exclusion criteria (Figure 2). The inclusion criteria were patients over 18 years of age, classified clinically as C2-C6 according to the CEAP classification, with at least one follow-up visit one year after the procedure. Exclusion criteria included patients with a history of surgical or sclerotherapy treatment for varicose veins in the lower limbs, neurological or rheumatological problems, and the presence or history of deep vein thrombosis. A non-probabilistic convenience sampling was performed.

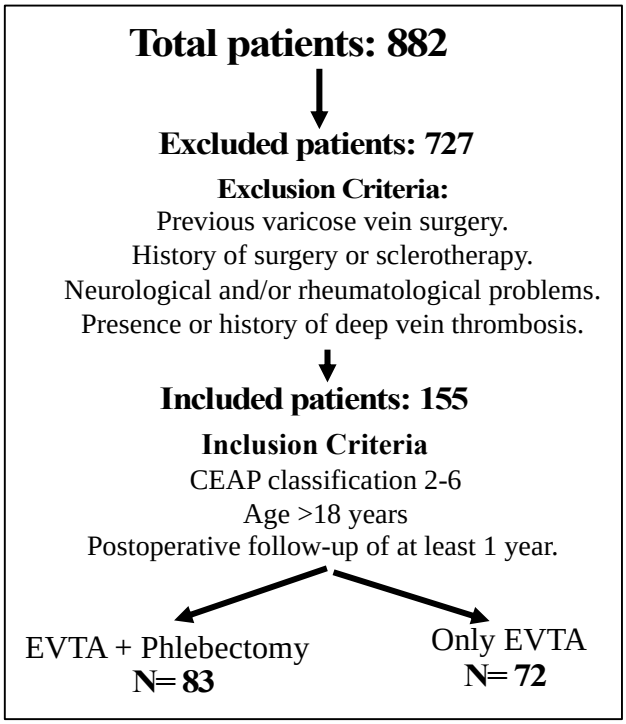


**Figure 2: Flowchart of patient selection for data analysis.**
Flowchart of patient selection with CVD treated with endovascular thermal ablation at the general hospital of Mexico between 2021 and 2024. A total of 882 records were evaluated, with 727 patients excluded for not meeting the inclusion criteria.

The patients presented with varicose veins secondary to reflux in the greater and lesser saphenous veins, identified previously by ultrasonographic tracing. The 2004 CEAP clinical classification was used to standardize the clinical evaluation of the patients (Table 1).

Continuous variables, such as age, weight, and BMI, were expressed as means and standard deviations (SD). The student's t test was used to compare means between the two groups. Categorical variables, such as gender, comorbidities, and CEAP classification, were presented as percentages and compared between the groups using the chi-square test ($\chi^2$).

**Table 1: CEAP classification for CVD CEAP classification.[3]**

| Class (C) | Clinical description |
|---|---|
| **C0** | No visible or palpable signs of venous disease |
| **C1** | Telangiectasias or reticular veins |
| **C2** | Varicose veins |
| **C3** | Edema without skin trophic changes |
| **C4a** | Pigmentation or venous eczema |
| **C4b** | Lipodermatosclerosis or white atrophy |
| **C5** | Healed venous ulcer |
| **C6** | Active venous ulcer |

CEAP classification for CVD: The CEAP classification, standing for clinical, etiological, anatomical, and pathophysiological, describes the severity of venous disease, ranging from the absence of visible clinical signs to active venous ulcers, providing a standardized system for managing and evaluating patients.

The proportions of complications between the two groups (EVTA with phlebectomy vs. EVTA without phlebectomy) were also compared using the chi-square test. Continuous variables with a normal distribution were expressed as means and standard deviations (SD). Medians were presented for other continuous variables. Categorical variables were presented as percentages. Statistical significance was calculated and compared between the two groups using either the chi-square test ($\chi^2$) or the unpaired Student's t-test, as appropriate. P-values less than 0.05 were considered statistically significant.

This approach allowed for the determination of whether phlebectomy had a significant impact on the reduction of varicose vein recurrence. P values less than 0.05 were considered statistically significant in all the tests performed. The data were collected from patient records. All statistical analyses were performed using IBM SPSS, version 24.

### *Hypothesis*

EVTA with concomitant phlebectomies is effective in the treatment of CVD without prior treatment, leading to a statistically significant difference in the recurrence of varicose veins pre- and post-procedure.

### *General objective*

General objectives were to evaluate the efficacy of EVTA with concomitant phlebectomies in the treatment of CVD without prior treatment, through a statistical comparison of varicose vein recurrence pre- and post-procedure.

### *Specific objectives*

Specific objectives were to determine whether there is a statistically significant difference in the recurrence of varicose veins pre- and post-EVTA with concomitant phlebectomies for the treatment of CVD without prior treatment, to determine the demographic, surgical, and clinical characteristics of the population evaluated for CVD without prior treatment, to identify the percentage of complications for each procedure of EVTA in the treatment of CVD without prior treatment and to determine the technical success of each procedure of EVTA for the treatment of CVD without prior treatment.

### *Procedure and follow-up*

Before the surgical treatment, the path of the varicose veins to be treated was marked on the skin using ultrasound, with the patient standing in an upright position (Figure 3). Afterward, the patients were placed in the supine or reverse Trendelenburg position. Following epidural anesthesia administered by the anesthesiology department, an ultrasound-guided puncture of the saphenous vein was performed, and a sheath was inserted into the target vein over a guidewire. A radial-tip laser catheter of 980 nm (ELVeS laser, Biolitec Inc., Germany) or a radiofrequency catheter (VNUS ClosureFast, Medtronic) was introduced through the sheath.

**Figure 3: Example of marking the path of varicose veins on the skin.**

Example of marking the path of varicose veins on the skin prior to the procedure with the help of ultrasound. This marking facilitates the complementary phlebectomy procedure by reducing time and providing greater visibility.

The catheter was advanced to the proximal end of the great saphenous vein (GSV) or small saphenous vein (SSV) under ultrasound visualization and placed 3 cm from its junction with the deep venous system. A solution of tumescent local anesthesia (TLA) (1000 mL of saline, 50 mL of 1% lidocaine with epinephrine, and 2 mL of dexamethasone) was injected into the saphenous

compartment under ultrasound guidance. After the ablation procedure, the catheter was slowly withdrawn while compressing the limb along the treated saphenous vein.

During the phlebectomy, avulsion was performed through 1-2 mm incisions using a hook, after the ablation treatment. The incisions were closed using steri-strips (3 M, St. Paul, MN), or, in very few cases, with a simple stitch using non-absorbable sterile surgical sutures. After the procedure, the treated area was covered with gauze, and an elastic compression bandage was applied from the foot region to the proximal third of the thigh. The bandage was removed the day after surgery, and patients were instructed to wear graduated compression stockings (20-30 mm Hg). Postoperative follow-up included visits at 15 days and 1 month after treatment. During these follow-up visits, a physical examination was conducted to assess complications related to the procedure, such as pain, skin burns, and hematomas.

If patients desired treatment for residual visible varicose veins during follow-up after the primary procedure, additional sclerotherapy was performed. Two 5 mL syringes were filled with 2 mL of 1% polidocanol and 2 mL of air using the Tessari method. The agent was injected immediately after preparation to occlude the residual superficial varicose veins, and the use of compression stockings was continued.

## RESULTS

Between 2021 and 2024, 155 patient records were analyzed for patients who underwent thermal ablation at the general hospital of Mexico "Dr. Eduardo Liceaga." Of these, 53.5% (83) underwent simultaneous phlebectomy during the procedure, while 46.5% (72) did not.

### *Demographic characteristics*

A total of 155 patients with CVD were analyzed, of which 69% were women and 31% were men. Of these, 83 patients (53.5%) underwent simultaneous phlebectomy, and 72 (46.5%) underwent only EVTA. The CEAP classification was used to categorize patients according to the severity of their venous disease.

The mean age for patients in the EVTA plus phlebectomy group was 53.1 years, with a standard deviation of 12.3, and 51.9 years for the EVTA-only group. The female sex predominated in both groups, with 66% of participants in the phlebectomy group and 72% in the EVTA-only group. Other demographic data are described in the Table 2.

As for the ablation device used, 76.8% of patients (119 cases) were treated with endovenous laser, while 23.2% (36 patients) were treated with radiofrequency. Regarding the treated leg, 51% (79 patients) had their left leg treated, 34.8% (54 patients) received bilateral treatment, and 14.2% (22 patients) had their right leg treated. Finally, the CEAP classification showed that 38% of the patients were in class C2, 29% in class C3, 21% in class C4, 8% in class C5, and 4% in class C6.

### *Recurrence rate and complications*

Recurrence was evaluated clinically and using Doppler ultrasound. It was defined as the appearance of visible varicose veins twelve months after the procedure. The recurrence rate at twelve months was 14.5 percentages in the EVTA with phlebectomy group and 27.2 percentages in the EVTA-only group (p value of 0.04). The frequency of the post-procedural complications is detailed in the Table 3.

**Tabla 2: Demographic characteristics.**

| Demographic characteristics. | EVTA + phlebectomy, (n=83) | Only EVTA, (n=72) | P value |
|---|---|---|---|
| **Average age (in years)** | 53.1±12.3 | 51.9±11.9 | 0.47 |
| **Women (%)** | 66% | 72% | 0.68 |
| **Average weight (kg)** | 71.2±14.8 | 70.6±15.6 | 0.53 |
| **Average height (m)** | 1.62±0.1 | 1.67±0.1 | 0.71 |
| **Average BMI (kg/m²)** | 27.1±4.5 | 27±4.1 | 0.62 |
| **Diabetes mellitus (%)** | 8.4% | 4.1% | 0.57 |
| **Hypertension (%)** | 22.8% | 19.4% | 0.52 |
| **Smoking (%)** | 25.3% | 18% | 0.68 |
| **Laser device (%)** | 75% | 78% | 0.45 |
| **Radiofrequency device (%)** | 25% | 22% | 0.45 |
| **Left leg (%)** | 18% | 12.5% | 0.62 |
| **Bilateral (%)** | 65% | 69.4% | 0.71 |
| **Right leg (%)** | 16.8% | 18.05% | 0.58 |
| **CEAP class C4-C6 (%)** | 35% | 27% | 0.23 |

Clinical and demographic characteristics of the groups of patients with chronic venous disease treated with EVTA with and without phlebectomy. The CEAP classification was used to determine the severity of the pathology, with a predominance in females. Data on comorbidities, type of the ablation device, and the treated leg were recorded, providing a detailed clinical profile of the studied population.

**Tabla 3: Recurrence and complications.**

| Outcome (%) | EVTA + phlebectomy, (n=83) | Only EVTA, (n=72) | P value |
|---|---|---|---|
| **Recurrence** | 14.5% | 27.2% | 0.04 |
| **Pain** | 19.3% | 16.7% | 0.67 |
| **Hematoma** | 13.3% | 8.3% | 0.23 |
| **DVT** | 0% | 0% | N/A |

Recurrence and complication rates 12 months post-procedure in patients treated with EVTA with and without phlebectomy. Recurrence was evaluated using Doppler ultrasound and the appearance of visible varicose veins. A significant difference in recurrence rate was observed between both groups, with a higher percentage in the EVTA-only group (p=0.04)

***Success rate***

The procedure's success was defined as the absence of recurrence of varicose veins at 12 months. The success rate of the procedure was 86.7% for the phlebectomy group and 65.2% for the non-phlebectomy group (p=0.003) (Table 4).

**Table 4: Success rate.**

| Outcome | EVTA + phlebectomy, (n=83) | Only EVTA, (n=72) | P value |
|---|---|---|---|
| **Success rate (%)** | 86.75% | 65.28% | 0.003 |

Success rate of the procedure at 12 months in patients treated with EVTA with and without phlebectomy. Success was defined as the absence of varicose vein recurrence. A higher success rate was observed in the group that received phlebectomy compared to the EVTA-only group, showing a statistically significant difference (p=0.003).

## DISCUSSION

In this study, the results obtained could suggest that EVTA concomitant with phlebectomy may provide a higher technical success rate compared to EVTA alone. The recurrence rate was higher in the EVTA group without phlebectomy, given that the p=0.044, which suggests that the combination of EVTA with phlebectomy is more effective in reducing recurrence of varicose veins.

These findings are consistent with the results reported by Hamann et al who observed that concomitant phlebectomy resulted in significant clinical improvement and reduction in varicose vein recurrence compared to endovenous ablation alone.[12] Similarly, Gibson et al noted an improvement in aesthetic outcomes and a higher rate of patient satisfaction when EVTA combined with phlebectomy, confirming that simultaneous treatment of tributary veins can improve long-term results.[13]

In contrast, Brittenden et al who compared phlebectomy with post-EVTA sclerotherapy, found that while both procedures had similar success rates, phlebectomy was associated with less postoperative pain and faster recovery.[14]

Regarding complications, although no significant differences were observed between the two groups, the phlebectomy group showed a tendency for more minor complications such as hematomas and postoperative pain, which is similar to previous studies. For example, Kalodiki et al documented a slightly higher rate of hematomas in patients undergoing phlebectomy compared to those receiving only EVTA, although these complications did not significantly affect long-term clinical outcomes.[10]

***Limitations***

The main limitations of this study include its retrospective design, which may introduce bias due to incomplete records, and the sample size, which might not be representative of the entire population with CVD. Additionally, the 12-mont follow-up is limited for assessing long term recurrence, and the lack of randomization is group allocation could lead to selection bias. Finally, the clinical assessment of recurrence, although appropriate, may be subject to variability in examiner technique and imaging methods used.

## CONCLUSION

The study concludes that the combination of EVTA with phlebectomy is more effective than EVTA alone, showing a higher success rate and lower recurrence of varicose veins at 12 months, without a significant increase in postoperative complications. However, the study is limited by its retrospective design and sample size. Therefore, prospective and randomized long-term studies are recommended to confirm these findings and evaluate the durability of the results.

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