DETERMINANTS OF RECURRENCE RATE DURING MIDTERM FOLLOW-UP OF PATIENTS AFTER ENDOVENOUS LASER ABLATION OF PRIMARY LOWER LIMB VARICOSE VEINS

Mohammed Hatem1*, Mahmoud Sobhy1, Wageh Fawzy1, Kareem Sabry1 and Ahmed Al-Taher2

ABSTRACT:

Background: The goal of this prospective cohort study was to study the different determinants impacting primary varicose vein recurrence rates and patterns after endovenous laser ablation (EVLA) for primary lower limb varicose veins.

Patients and Methods: 127 symptomatic patients (127 limbs) with great saphenous vein reflux (>0.5 seconds), GSV diameter > 3 mm and pre-operative incompetent perforators were followed up within two years for recurrence after EVLA.

Outcomes: Recurrence was defined clinically by venous clinical severity score (VCSS) and CEAP classification and radiologically by patterns of reflux on duplex ultrasound examination. Assessment was done at 1, 6, 12 and 24 months after the procedure.

Results: Two-year life table analysis showed varicose vein recurrence in 9 (7.1%) of limbs. Varicose vein recurrence was mostly seen owed to due to BMI more than 30.5 kg/m² in 77.8% (p < 0.001, 95% CI 1.105 to 1.590) of recurrence patients, refluxing anterior accessory saphenous vein in 77.8% of patients (p < 0.001, 95% CI 3.2 to 1669.1) and postoperative incompetent perforators in 77.8% of patients (p < 0.001, 95% CI 2.7 to 69.3). Age, gender and pre-operative GSV diameter ≥ 5.5 mm were statistically insignificant in determination of recurrence.

Conclusion: BMI, refluxing anterior accessory saphenous vein and postoperative incompetent perforators are the most important determinants of recurrence after EVLA with a statistically significant impact in comparison with age, gender and preoperative dilated GSV diameter ≥ 5.5 mm.

Keywords: EVLA: Endovenous laser Ablation, AASV: Anterior Accessory Saphenous Vein, GSV: Great Saphenous Vein, VV: Varicose Veins, BMI: Body mass index, ROC: Receiver-operating characteristic curve.

INTRODUCTION:

Chronic venous disease (CVD) is one of the most common pathologies in the general population of adults in both industrialized and developing countries[1].

Superficial venous incompetence is a common disorder affecting 25% of women and 15% of men presenting with varicose veins. Venous insufficiency increases with age and is most commonly caused by primary valvular incompetence. The most important factors appear to be heredity, female sex, and previous phlebitis, pregnancy, obesity and use of OCPs, deep venous reflux[2].
In 1999, Boné first reported on delivery of endoluminal laser energy into GSV with success\cite{3}. Endovenous laser treatment which received approval from the US Food and Drug Administration in January 2002 allows delivery of laser energy directly into the blood vessel lumen. Enough heating of the vein wall is necessary to cause collagen contraction and denudation of endothelium\cite{4}.

This technique works by using a range of different wavelengths to target different depths and diameters of vessels. Acting as a chromophore, hemoglobin within red blood cells of the target vein absorbs and converts the light to thermal energy which causes vessel destruction\cite{5}.

Current guidelines have replaced conventional surgery by endovenous laser ablation (EVLA) and other endovenous thermal ablation (EVTA) techniques as the treatment of choice for incompetent saphenous veins and rendered them more effective with a reported success rate of approximately 90% in the previous studies\cite{6}.

Studies showed that Neovascularization has been reported more frequently following surgery than after endovenous procedures. On the other hand, recanalization was reported more with EVLA than after surgery\cite{7}.

Optimum prevention of recanalization and refluxing in a previously ablated GSV is tailored to the identification and addressing the potential risk factors: higher VCSS score, GSV diameter, saphenofemoral junction reflux, length of ablated vein, type of device & BMI has all been reported to increase risk of Recurrence\cite{8}.

**PATIENTS AND METHODS:**

This is a prospective nonrandomized cohort study which is a single arm clinical study to assess the determinants of recurrence rate including demographic and radiological data of patients after endovenous laser treatment of patients with primary varicose veins within 2 years postoperatively.

127 patients were selected for this prospective cohort after assessing the sample size using PASS® version 11 program, setting the type-1 error (\(\alpha\)) at 0.05 and power at 80%.

Criteria for selection included all symptomatic patients with Primary varicose veins caused by SFJ incompetence with GSV reflux (>0.5 seconds) on Valsalva, multiple incompetent perforators (midthigh, below knee, above knee and ankle perforators), diameter>3 mm, as demonstrated by duplex US imaging and age up to 65 years.

While Patients with Nonpalpable pedal pulses (ABI< 0.9), major co-morbidities (ASA >3), bleeding disorders, old or recent deep vein thrombosis with or without recanalization as well as patients showing extremely tortuous GSV or superficial venous thrombosis or vein greater than12 mm in diameter on duplex U/S were excluded.

Patients who met the criteria were evaluated for symptomatic venous disease. Of the 127 patients, 73% of this number had been operated on by the participating surgeons in this study.

Laser ablation was performed via target linear endovenous energy density (LEED) of 80–100 J/cm using 1470-nm, continuous-mode diode laser via a 600-\(\mu\)m bare-tip fiber pullback of 1cm/10seconds.

The Primary end point of the study was based on "Recommended reporting standards for endovenous ablation for the treatment of venous insufficiency in 2007 which was defined as a clinical outcome of importance to patients (relief of the dominant presenting symptom, venous ulcer healing, prevention of progression of chronic venous insufficiency or a combination of these outcomes) in addition to anatomic success defined as successful
ablation of the target vein, as demonstrated by complete lack of flow or disappearance of vein by duplex ultrasound imaging in the entire treated GSV\(^9\).

After completing the study tool, the form was reviewed for accuracy and resulting data were given a numerical value. The data was entered the Statistical Package IBM© SPSS© Statistics version 26 (IBM© Corp., Armonk, NY) for statistical analysis.

Data was entered into 8 categories for each patient in the study: BMI, preoperative dilated GSV diameter \(\geq 5.5\) mm, postoperative residual incompetent perforators, preoperative accessory saphenous vein, age, gender, pattern and time to recurrence were documented.

Patients were followed up for recurrence at 1, 6, 12, 24 months which included re-evaluation of CEAP classification (Table 1), Venous Extremity Severity Score (Table 2) in addition to duplex scanning of treated limb in the standing position seeking for reflux(>0.5), partial or total occlusion of a segment or whole GSV(diagram 1), patency of deep venous system, presence of incompetent perforators, presence of accessory saphenous vein.

Table 1: CEAP classification for chronic venous disorders developed in 1994 as a descriptive classification and incorporated into "Reporting standards" in venous diseases\(^{10}\).

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Absent = 0</th>
<th>Mild = 1</th>
<th>Moderate = 2</th>
<th>Severe = 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>None</td>
<td>Occasional, not restricting Daily activity or requiring analgesics</td>
<td>Daily, moderate activity limitation, occasional analgesics</td>
<td>Daily, severe limiting activities or requiring regular use of analgesics</td>
</tr>
<tr>
<td>Varicose veins</td>
<td>None</td>
<td>Few, scattered: branch VV’s including corona phlebectatica</td>
<td>Multiple: GS VV confined to calf or thigh</td>
<td>Extensive: thigh and calf VV’s or GS and SS distribution</td>
</tr>
<tr>
<td>Venous edema</td>
<td>None</td>
<td>Evening ankle edema only</td>
<td>Afternoon edema, above ankle but below knee</td>
<td>Morning edema Extends to knee and above requiring activity change, elevation</td>
</tr>
<tr>
<td>Skin pigmentation</td>
<td>None or focal, Low intensity (Tan)</td>
<td>limited to peri malleolar area, and old (brown)</td>
<td>Diffuse over most of gaiter distribution (lower 1/3) or recent pigmentation (purple)</td>
<td>Wider distribution (above lower 1/3) and recent pigmentation</td>
</tr>
</tbody>
</table>

Table 2: venous clinical severity scores (VCSS)
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<table>
<thead>
<tr>
<th>Inflammation</th>
<th>None</th>
<th>Mild cellulitis, limited to marginal area around ulcer</th>
<th>Moderate cellulitis, involves most of gaiter area (lower 1/3)</th>
<th>Severe cellulitis (lower 1/3 and above) or significant venous eczema</th>
</tr>
</thead>
</table>

| Induration            | None               | Focal, circummalleolar (<5 cm)                       | Medial or lateral, less than lower third of leg               | Entire lower third of leg or more                            |

| No. of active ulcers  | 0                  | 1                                                    | 2                                                             | > 2                                                          |
| Active ulceration, duration | None               | < 3 months                                           | > 3 month < 1 year                                           | Not healed > 1 y                                            |
| Active ulcer size     | None               | < 2-cm diameter                                      | 2- to 6-cm diameter                                          | > 6-cm diameter                                             |
| Compressive therapy   | Not used: or not compliant | Intermittent use of stockings                       | Wears elastic stockings most days                            | Full compliance: stockings + elevation                       |

The VCSS includes 9 hallmarks of venous disease, each scored on a severity scale from 0 to 3. Compression therapy was added to scoring system with higher scores representing greater compliance. Absence of venous disease if score ≤ 3 and score ≥ 8 denotes severe disease.\(^{[11]}\)

Diagram 1: Anatomical patterns of recurrent varicose veins in the groin. SFJ, saphenofemoral junction; DEP, deep external pudendal vein; O, scar tissue. Type 1 recurrences were those in which there was some residual connection between the superficial and deep systems at or immediately around the saphenofemoral junction, requiring re-exploration. These were further subdivided by the nature of the connection into three subgroups as shown above. Type 2 recurrences were those in which there was no such connection; the recurrence arose either across the groin (i.e. derived from branches of the internal iliac vein or abdominal wall veins) or from thigh perforators.\(^{[12]}\)
RESULTS:

Of the 127 patients entered into the study, 45 patients were females (35.4%) and 82 patients were males (64.6%). The mean age was 41±12 years (21-65). Patients had mean BMI 29.3kg/m² ± 4.5 (21 – 42). GSV was dilated (≥5.5 mm) in 79(62.2%) patients (table 3).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>F 45 (35.4%) M 82 (64.6%)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>41 ± 12 (21 – 65)</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>29.3 ± 4.5 (21 – 42)</td>
</tr>
<tr>
<td>Preoperative dilated GSV (more than 5.5 mm)</td>
<td>79 (62.2%)</td>
</tr>
<tr>
<td>Patent refluxing Anterior Accessory SV</td>
<td>7 (5.5%)</td>
</tr>
<tr>
<td>Partial recanalization of GSV</td>
<td>6(4.72%)</td>
</tr>
<tr>
<td>Non-truncal varicosities(neovascularization)</td>
<td>5(3.93%)</td>
</tr>
<tr>
<td>Postoperative incompetent perforators</td>
<td>29 (23.2%)</td>
</tr>
<tr>
<td>Recurrence</td>
<td>9 (7.1%)</td>
</tr>
</tbody>
</table>

Data are number (%) or mean ± SD and range.
Recurrence occurred in 9 limbs (7.1%) during the two-year follow-up (diagram 2).

In our population study, pain was the chief presenting symptom in 42% of total number of patients, visible varicose veins in 41%, active venous ulcer in 7%, skin pigmentation in 4% and leg edema in 6% (diagram 3).
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Diagram (3): Bar chart showing the main symptoms in the studied patients

The primary endpoint was reached in 92.9% of patients during the two-year follow-up. No progression of CVI according to VCSS and CEAP classification was noted in all non-recurrent patients. 7 patients had complete ulcer healing. Pain as the dominant symptom was improved in 50 patients. Venous edema became less significant in 7 patients. Skin pigmentation became limited in 5 patients. Varicose veins disappeared in 49 patients. Complete lack of flow in GSV was seen in all non-recurrent patients. (table 4)

Table (4): Primary end point in non-recurrent patients

<table>
<thead>
<tr>
<th>Primary endpoint</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete ulcer healing</td>
<td>7</td>
</tr>
<tr>
<td>Pain improvement</td>
<td>50</td>
</tr>
<tr>
<td>Venous edema(C3)</td>
<td>7</td>
</tr>
<tr>
<td>Skin pigmentation</td>
<td>5</td>
</tr>
<tr>
<td>VV disappearance</td>
<td>49</td>
</tr>
<tr>
<td>Complete GSV occlusion</td>
<td>118</td>
</tr>
</tbody>
</table>

Of the recurrent patients, 2 were females (22.2%) while 7 were males (77.8%). The mean age of recurrence was 44.9 years ± 8.4 compared to 41.1 years ± 12.2 in the non-recurrent group. The mean BMI was 34.1 kg/m² ± 5.3 (P=0.001) in the recurrent group compared to 28.9 ± 4.2 in the non-recurrent group. Age, sex and preoperative GSV diameter (≥5.5 mm) were not statistically significant in both groups (P=0.152) (table 5).

7 of the 9 recurrent patients (77.8%) had patent refluxing anterior accessory saphenous vein (P<0.001) and 7 of them (77.8%) had postoperative residual incompetent perforators (P<0.001).

Recurrence patterns included 5 patients (55.6%) with non-truncal tributaries: 3 (33.3%) of them had incompetent perforators and 4 (44.4%) of them had patent AASV (table 5).

6 patients (66.6%) showed partial recanalization of GSV: 5 (55.6%) of them had incompetent perforators and 5 (55.6%) of them had patent AASV (table 5).

No anterior accessory saphenous vein was found and only 22 patients (19%) had postoperative incompetent perforators in the non-recurrent group (table 5).
Determinants of recurrence rate during midterm follow-up of patients after endovenous laser…

Table (5): Comparison of patients who suffered or did not suffer recurrence

<table>
<thead>
<tr>
<th>Variable</th>
<th>No recurrence (n=118)</th>
<th>Recurrence (n=9)</th>
<th>P-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>43 (36.4%)</td>
<td>2 (22.2%)</td>
<td>0.490</td>
</tr>
<tr>
<td></td>
<td>75 (63.6%)</td>
<td>7 (77.8%)</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>41.1 ± 12.2</td>
<td>44.9 ± 8.4</td>
<td>0.365§</td>
</tr>
<tr>
<td>M</td>
<td>28.9 ± 4.2</td>
<td>34.1 ± 5.3</td>
<td>0.001§</td>
</tr>
<tr>
<td>Age (years)</td>
<td>41.1 ± 12.2</td>
<td>44.9 ± 8.4</td>
<td>0.365§</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>28.9 ± 4.2</td>
<td>34.1 ± 5.3</td>
<td>0.001§</td>
</tr>
<tr>
<td>Preoperative dilated GSV</td>
<td>71 (60.2%)</td>
<td>8 (88.9%)</td>
<td>0.152</td>
</tr>
<tr>
<td>Accessory SV</td>
<td>0 (0.0%)</td>
<td>7 (77.8%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Partial recanalization of GSV</td>
<td>0(0.0%)</td>
<td>6(66.7%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Non truncal varicosities (neovascularization)</td>
<td>0(0.0%)</td>
<td>5(55.6%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Postoperative incompetent perforators + Partial recanalization of GSV</td>
<td>0(0.0%)</td>
<td>5(55.6%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Accessory SV + Partial recanalization of GSV</td>
<td>0(0.0%)</td>
<td>5(55.6%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Postoperative incompetent perforators + Non truncal varicosities</td>
<td>0(0.0%)</td>
<td>3(33.3%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Accessory SV + Non truncal varicosities</td>
<td>0(0.0%)</td>
<td>4(44.4%)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Data are number (%) or mean ± SD.

*Fisher’s exact test unless otherwise indicated.
§Unpaired t-test.

BMI, accessory SV and postoperative incompetent perforators were compared in both recurrent and non-recurrent patients and were found to be statistically significant in determination of recurrence (diagrams 4, 5, 6).

Diagram (4): Mean BMI in patients with or without recurrence. Error bars represent the standard error (SE).

Diagram (5): Percentage of patients with accessory SV among those who suffered or did not suffer recurrence.
Diagram (6): Percentage of patients with postoperative incompetent perforators among those who suffered or did not suffer recurrence.

The median time to recurrence in patients with accessory saphenous vein was 12 months but it could not be determined in patients without accessory saphenous vein. Difference between both Kaplan-Meier curves is statistically significant (hazard ratio = 73.1, 95% CI 3.2 to 1669.1, Mantel-Cox log-rank chi-squared = 116.080, df = 1, P-value <0.001) (diagram 7).

Diagram (7): Kaplan-Meier curves for the time to recurrence in patients with or without accessory SV.

The median time to recurrence in patients with or without postoperative incompetent perforators could not be determined in either group. However, difference between both Kaplan-Meier curves is statistically significant (hazard ratio = 13.7, 95% CI 2.7 to 69.3, Mantel-Cox log-rank chi-squared = 18.983, df = 1, P-value <0.001) (diagram 8)

Diagram (8): Kaplan-Meier curves for the time to recurrence in patients with or without postoperative incompetent perforators.
BMI, accessory SV and postoperative incompetent perforators were selected based on statistically significant relation to recurrence by further bivariate analysis. Of these variables, BMI was the only independent predictor for recurrence that is retained by backward binary logistic regression (odds ratio = 1.325, 95% CI = 1.105 to 1.590, P-value = 0.002) (table 6).

Table (6): Results of backward binary logistic regression analysis for prediction of recurrence.

<table>
<thead>
<tr>
<th>Variable*</th>
<th>B</th>
<th>SE</th>
<th>Wald</th>
<th>P-value</th>
<th>Odds ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (kg/m²)</td>
<td>0.282</td>
<td>0.093</td>
<td>9.182</td>
<td>0.002</td>
<td>1.325</td>
<td>1.105 to 1.590</td>
</tr>
<tr>
<td>Constant</td>
<td>-11.437</td>
<td>3.115</td>
<td>13.479</td>
<td>&lt;0.001</td>
<td>1.325</td>
<td>1.105 to 1.590</td>
</tr>
</tbody>
</table>

B = regression coefficient, Wald = Wald statistic, 95% CI = 95% confidence interval.
*Variables removed by backward regression: Accessory SV and Postoperative incompetent perforators.

BMI has fair to good predictive value for recurrence with an area under the ROC curve (AUC) of 0.766 (95% CI = 0.605 – 0.926, P-value = 0.001). Best cutoff is a BMI >30.5 kg/m² (sensitivity = 77.8%, specificity = 61.0%, J-index = 0.388) (diagram 9).

Diagram (9): Receiver-operating characteristic (ROC) curve for prediction of recurrence using BMI.

DISCUSSION

Lower limb venous incompetence is an extremely important issue impacting lifestyle and morbidity of patients affecting up to 23% of adults and a striking incidence of 15% in male and 25% females. Great saphenous vein insufficiency contributes to most of the venous incompetence[13].

Although EVLA is considered the optimal treatment modality for primary varicose veins in terms of providing secure ablation and declined recurrence rates, determinants impacting the rate of recurrence following this intervention is still not yet thoroughly studied in the previous literature.

Recurrence after EVLA can be defined by a duplex u/s finding of recanalization either partial or total for the previously ablated great saphenous vein, or reemergence of varicosities at the same site of the great saphenous vein which could be due to neovascularization or non-avulsion of the thigh and calf perforators. Relapse or
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progression of CEAP classification or VCSS correlates to clinical recurrence[14].

Age, Gender, BMI, pre-operative dilated GSV (≥5.5mm), preoperative AASV and postoperative incompetent perforators were the major determinants studied in each patient. Age and Gender were found to be statistically insignificant in our study. On the contrary, two prospective studies considered sex as a predictor of recanalization, but this was not confirmed in multivariable analysis [15],[16]. In addition, a metanalysis systematic review of 15 trials by Vander der Velden found that male gender is an independent predictor of GSV recanalization after EVLA[8]. Although no evidence was found in the literature to explain the male predominance in risk of recanalization, it could be hypothesized that the vein wall of males is thicker than the vein wall of females.

Although pre-operative dilated GSV(≥5.5mm) was seen 88.6% of recurrent patients compared to 66.7% of non-recurrent patients in our study, it was found to be statistically insignificant. This was contradicted by the results of a recent study in 2019 by Kemaloglu C which concluded that GSV diameter may predict the risk of early recanalization after the EVLA of the GSV especially if the diameter > 10 mm.) [17]. It became a controversial issue to treat patients with very large GSV diameter(> 12 mm) using EVLA. Some studies have found no influence of truncal vein size on outcomes but a pooled analysis of GSV recanalization in 15 studies in 2016 found vein diameter to be a strong predictor of recanalization one year after endothermal ablation[8]. Another study by Desmyttere J et al., found that recurrence was observed when the GSV trunk diameter >8 mm. One can hypothesize that blood remaining inside the lumen could absorb the laser light energy, limiting consequently the light transmitted to the vessel wall[18]. Fernández et al., also found that GSV diameter ≥8.5 mm is an independent risk factor for recanalization[16]. As we used standard LEED for above knee GSV segment (100 j/cm) and for below knee segment (80 j/cm) and one of the two patients with preoperative GSV diameter > 8 mm developed recurrence in our study, we suggest that large GSV diameter could play a role in recanalization rates after EVLA although it was not confirmed in our study.

On assessing the BMI of patients in our study, it was found to be independent variable for recurrence and has fair to good predictive value for recurrence after EVLA with cutoff > 30.5 kg/m2. In comparison of this significant statistical finding in our study to previous studies, there was disagreement about the influence of high body mass (described as ‘obese with a large adipose thigh and leg) on using endothermal ablation. This divided opinion reflects the evidence, which provides no strong data. A retrospective cohort study by Merchant and Pichot documented an association between high body mass index (BMI) and recurrence after five years. The mechanism by which a high BMI results in anatomical failure remains unclear. However, patients with high BMI values tend to pose more procedural challenges such as inadequate compression and incomplete removal of varicose veins that result in incomplete relief of venous hypertension[15]. Fernández et al also found BMI >30kg/m2 was independent risk factor for recanalization and proposed that fibrosis caused by the EVLT was overcome by increased femoral venous pressure, with the saphenous vein reopening in a proximal to distal fashion, sometimes into a varicose tributary close to the SFJ that functions similarly to a relief valve[16]. Timperman has also found that obesity was common among patients in whom recanalization occurred due to increase abdominal and femoral venous pressure[19]. On the other hand, Theivacumar et al., reported no influence of BMI on early truncal occlusion rates after laser ablation[7]. Further analysis of 15 trials by Van der
Velden et al., showed that BMI was not a predictor of truncal ablation at one year; however, only 8.7% of the patients with a BMI >30 kg/m² were included and this might have caused underestimation of the influence of BMI on recanalization⁸. Moreover, a true relationship between recurrent GSV insufficiency and incompetent postoperative calf perforators was documented in the REVATA study and concluded that GSV ablation should begin at mid calf level below these perforators to reduce the chance of future new insufficiency in untreated segments in addition to ablation of calf perforators¹¹. One possible explanation to new AAVS insufficiency is that once the GSV is ablated, flow is then directed to the AASV. Due to inherent defects in vein wall or valves, resultant insufficiency occurs. Prior to GSV ablation, refluxing flow mainly follows the larger diameter GSV¹¹. A study by Winokur et al., showed that most cases of recurrence occurred due to recanalization of a segment of a previously treated vein with recurrent reflux or new reflux in the anterior accessory saphenous vein and not due to incompetent perforator¹². This reinforces our findings that preoperative patent AAVS and postoperative incompetent perforators could play a major role in prediction of recurrence through new retrograde flow in AASV after GSV ablation and enlargement of calf and thigh perforators "arterialization" mainly which enhances GSV recanalization rates and new GSV reflux. The presence of AAVS and postoperative incompetent thigh and calf perforators in addition to BMI > 30 kg/m² are major determinants of recurrence after EVLA and are documented in the most previous studies. It is not clear if patent refluxing AASV and incompetent perforators affected a certain pattern of recurrence (partial recanalization and non-truncal varicosities) as they occurred nearly at the same percentage in both pattern types in our study. Several explanations were mentioned to justify this correlation with no confirmatory data in previous studies.
Moreover, our study did not address the role of SSV incompetency in recurrence due to lack of cases as well as the amount of energy and the speed of pullback due to standardization of high energy and constant pullback for all patients.

Conclusion:
Our study focused on major determinants of recurrence rates and found a correlation between BMI, postoperative incompetent perforators and pre-operative patent AASV and recurrence rates during midterm follow-up. Those findings were comparable to the previous literature: however, GSV diameter was found to be statistically insignificant compared to other studies. Other variables like age and gender were not established as predictors of recurrence. As a result, further studies are needed to prove the relationship of those determinants to recurrence rates.

Conflict of Interests:
The authors declare that there is no conflict of interests regarding the publication of this paper.

REFERENCES:


العوامل المؤثرة لمعدل التكرار أثناء متابعة متوسطة المدى لمرضى الدوالي الأولية بعد عملية استئصال دوالي الساق بالليزر

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كلية الطب، جامعة عين شمس

المقدمة: كان الهدف من هذه الدراسة الأترابية المتكررة تحديد العوامل المختلفة التي تؤثر على معدلات تكرار الإصابة بالدوالي الأولية والدوالي الأمامية والذراعية بعد الاتصال بالليزر لأوردة دوالي الساق السفلية الأولية.

طريق البحث: تمت متابعة 127 مريضاً (127 ساقاً) يعانون من بعض الأعراض التالية لأجل استخدام دوالي الساق بالليزر للوقوف على معدلات تكرار الإصابة. وقد فقد سبعات وعشرون مريضاً المتابعة، فخفض 100 مريضاً (100 ساق) إلى التحليل. وقد تم استخدام معدل التكرار بواسطة درجة الشدة الإكلينيكية الوريدية، وفواصل الفحص فوق الصوتية المزدوجة، وأجريت القياسات بعد شهر واحد ودوار شهرين.

النتائج: أظهرت جداول التحليل متوافقة مع مداردة عامين حدوث تكرار الدوالي في 9 أشخاص (7.1%). وقد عُزى تكرار الدوالي إلى ارتفاع الوريد الصافي الشبيه الأمامي في 33.8٪ من المرضى (ع > 0.01، وواصل تقة 0.01، وواصل تقة 2.3٪). وإعادة ظهور الوريد الصافي الكبير جزئياً (0.9٪)، والدوالي غير الجذعية (15.0٪) وإعادة التوقيع الزائد (2.7٪) (ع > 0.01، وواصل تقة 0.05، وواصل تقة 1.1٪) من مرضى التكرار.

الخلاصة: أظهرت نتائج التحليل أن متوسط كتلة الجسم وحموضة الوريد الصافي الشبيه الأمامي والمتوافق المرتفع في المرضى الأقل أعمارهم من 30.5 كجم/م 2 في 0.57٪ (ع > 0.01، وواصل تقة 0.01، وواصل تقة 1.1٪) من مرضى التكرار.

الخلاصة: أظهرت نتائج التحليل أن متوسط كتلة الجسم وحموضة الوريد الصافي الشبيه الأمامي والمتوافق المرتفع في المرضى الأقل أعمارهم من 30.5 كجم/م 2 في 0.57٪ (ع > 0.01، وواصل تقة 0.01، وواصل تقة 1.1٪) من مرضى التكرار.

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الخلاصة: أظهرت نتائج التحليل أن متوسط كتلة الجسم وحموضة الوريد الصافي الشبيه الأمامي والمتوافق المرتفع في المرضى الأقل أعمارهم من 30.5 كجم/م 2 في 0.57٪ (ع > 0.01، وواصل تقة 0.01، وواصل تقة 1.1٪) من مرضى التكرار.

الخلاصة: أظهرت نتائج التحليل أن متوسط كتلة الجسم وحموضة الوريد الصافي الشبيه الأمامي والمتوافق المرتفع في المرضى الأقل أعمارهم من 30.5 كجم/م 2 في 0.57٪ (ع > 0.01، وواصل تقة 0.01، وواصل تقة 1.1٪) من مرضى التكرار.

الخلاصة: أظهرت نتائج التحليل أن متوسط كتلة الجسم وحموضة الوريد الصافي الشبيه الأمامي والمتوافق المرتفع في المرضى الأقل أعمارهم من 30.5 كجم/م 2 في 0.57٪ (ع > 0.01، وواصل تقة 0.01، وواصل تقة 1.1٪) من مرضى التكرار.

الخلاصة: أظهرت نتائج التحليل أن متوسط كتلة الجسم وحموضة الوريد الصافي الشبيه الأمامي والمتوافق المرتفع في المرضى الأقل أعمارهم من 30.5 K جم/م 2 في 0.57٪ (ع > 0.01، وواصل تقة 0.01، وواصل تقة 1.1٪) من مرضى التكرار.