

Role of Endovenous Laser Ablation versus Radiofrequency Ablation for Primary Varicose Veins

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ABSTRACT

Background: varicose veins, a common problem with effects on quality of life, account for a significant cost burden on the health care system. They are enlarged, tortuous, subcutaneous veins that commonly occur in the legs. Varicose veins are caused by faulty valves and decreased elasticity in the vein walls, which allow blood to backflow and pool. This is known as venous reflux. The affected veins enlarge and appear as green, dark blue or purple protrusions just below the skin's surface.

Objective: in this study we aimed to compare short term outcomes and postoperative short term complications between EVLA and RFA.

Patients and Methods: this is an observational prospective study. It was carried out in General Surgery department and Vascular Surgery unit at Ain Shams Hospitals and in Kahraba hospital for Research and Treatment.

Results: there was no significant difference between radiofrequency powered segmental ablation and endovenous laser ablation according to demographic data.

Conclusion: there was no significant difference between radiofrequency powered segmental ablation and endovenous laser ablation according to demographic data.

Keywords: varicose veins, endovenous laser therapy, radiofrequency

INTRODUCTION

Varicose veins, a common problem with effects on quality of life, account for a significant cost burden on the health care system ⁽¹⁾. They are enlarged, tortuous, subcutaneous veins that commonly occur in the legs ⁽²⁾.

Varicose veins are caused by faulty valves and decreased elasticity in the vein walls, which allow blood to backflow and pool. This is known as venous reflux. The affected veins enlarge and appear as green, dark blue or purple protrusions just below the skin's surface ⁽³⁾.

The severity of symptoms associated with varicose veins varies and may include pain, heaviness, pruritis, ulceration, skin discoloration and edema.

Severe symptoms include thrombophlebitis, bleeding and venous dermatitis, which often require intervention ⁽⁴⁾.

A variety of therapies are available for treating varicose veins, including conservative therapies, surgical interventions and nonsurgical intervention. Conservative therapies are commonly recommended in asymptomatic patients or those with mild to moderate symptoms. Surgical interventions generally become necessary when symptoms of varicose veins significantly impinge on the patient's quality of life ⁽⁵⁾.

Junction ligation with or without vein stripping is generally appropriate when the GSV and SSV have reflux or incompetence is demonstrated on duplex scanning. This intervention is generally performed as an inpatient procedure under general anesthetic. Junction ligation involves

tying off the vessel at the SFJ or SPJ. Ligation alone usually leads to high rates of varicose vein recurrence; therefore, patients often require after-care treatment, such as sclerotherapy. In most cases, ligation is accompanied by GSV stripping and is generally regarded as the treatment of choice for varicose veins ⁽⁶⁾.

Two endovenous modalities include radiofrequency ablation (RFA) and endovenous laser therapy (ELT). Both treatments involve inserting a heat-generating laser fiber or catheter into the incompetent saphenous vein, positioned just below the SFJ or SPJ. Heat is generated through laser (ELT) or radiofrequency (RFA) energy, and as the fiber or catheter is slowly removed down the length of the vein, endothelial and venous wall damage occurs, causing contraction of the vein wall and ultimately destruction of the vessel ⁽⁷⁾.

AIM OF THE WORK

In this study we aim to compare short term outcomes and postoperative short term complications between EVLA and RFA.

Patients and Methods

This is an observational prospective study was carried out in General Surgery department and Vascular Surgery unit at Ain Shams Hospitals and in Kahraba hospital for Research and Treatment. Sample size was calculated using PASS® version 11 program, setting the type-1 error (α) at 0.05 with a width 0.1, and power at 80%. Result from previous studies showed that the average success rate for RFA 96.2% compared to 96.7% among EVLA patients. Based on this the needed sample is 12 cases per each group (24 total). **The study was approved by the Ethics Board of Ain Shams University.**

Inclusion Criteria: Males and females patients. Patients age (20-50) and fit for anesthesia. Varicose veins affecting the GSV system. Varicose veins confirmed on duplex ultrasound imaging.

Patients suitable for any of the treatment options.

Exclusion Criteria: Patients with secondary varicose veins due to: Deep vein thrombosis. Abdominal mass. Pregnancy.

Preoperative assessment:

After Informed written consent, patients were subjected to the following: Clinical evaluation and Duplex assessment.

Clinical evaluation was carried out for all patients according to the following scheme: Detailed history (disfigurement, pain, bleeding, deep venous thrombosis, anticoagulant therapy), Detailed general examinations, Lower limb examination to detect: Distribution of veins affected, Incompetent perforators, and Shape (spider, serpentine or saccular).

Duplex was done as a routine to all patients to detect: Patency of the deep system, Sapheno-femoral or Sapheno-popliteal reflux, Presence and number of perforators, Diameter of GSV, and Exclusion of deep venous incompetence.

Statistical analysis

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

The following tests were done: Independent-samples t-test of significance was used when comparing between two means. One-way analysis of variance (ANOVA) was used when comparing between more than two means. Chi-square (χ^2) test of significance was used in order to compare proportions between two qualitative parameters. The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following: Probability (P-value): P-value ≤ 0.05 was considered significant. P-value ≤ 0.001 was considered as highly

significant. P-value >0.05 was considered insignificant.

RESULTS

Table (1): Comparison between groups according to radiofrequency powered segmental ablation and endovenous laser ablation according to demographic data.

Demographic Data	RPSA (N=12)	EVLA (N=12)	t/x2 #	P-value
Age (years)				
Range	20-60	20-60	0.348	0.207
Mean±SD	41.48±6.22	43.05±6.46		
Sex				
Male	3 (25%)	4 (33.3%)	1.117#	0.665
Female	9 (75%)	8 (66.7%)		
BMI [wt/(ht)^2]				
Range	18-39	19-43	0.460	0.274
Mean±SD	26.25±3.94	27.83±4.17		

t-Independent Sample t-test; x²: Chi-square test; p-value >0.05 NS

Table (1) shows no statistically significant difference between radiofrequency powered segmental ablation and endovenous laser ablation according to demographic data.

Table (2): Comparison between groups according to radiofrequency powered segmental ablation and endovenous laser ablation according to CEAP class.

CEAP class	RPSA (N=12)	EVLA (N=12)	x2	p-value
C1	0 (0%)	0 (0%)	1.418	0.844
C2	3 (25%)	2 (16.7%)		
C3	8 (66.7%)	8 (66.7%)		
C4	1 (8.3%)	2 (16.7%)		
C5	0 (0%)	0 (0%)		
C6	0 (0%)	0 (0%)		

x²: Chi-square test; p-value >0.05 NS

Table (2) shows no statistically significant difference between radiofrequency powered segmental ablation and endovenous laser ablation according to CEAP class.

Table (3): Comparison between groups according to radiofrequency powered segmental ablation and endovenous laser ablation according to length of treated vein (cm).

Length of treated vein, cm	RPSA (N=12)	EVLA (N=12)	t-test	p-value
Range	16-62	16-58	1.092	0.650
Mean±SD	40.95±6.14	38.85±5.83		

t-Independent Sample t-test; p-value >0.05 NS

Table (3) shows no statistically significant difference between radiofrequency powered segmental ablation and endovenous laser ablation according to length of treated vein (cm).

Table (4): Comparison between groups according to radiofrequency powered segmental ablation and endovenous laser ablation according to GSV with incompetent terminal valve.

	RPSA (N=12)	EVLA (N=12)	x2	P-value
GSV with incompetent terminal valve	12 (100%)	12 (100%)	0.000	1.000

x²: Chi-square test; p-value >0.05 NS

Table (4) shows no statistically significant difference between radiofrequency powered segmental ablation and endovenous laser ablation according to GSV with incompetent terminal valve.

Table (5): Comparison between groups according to radiofrequency powered segmental ablation and endovenous laser ablation according to preoperative and postoperative Venous Clinical Severity Score (VCSS).

Venous Clinical Severity Score	RPSA (N=12)	EVLA (N=12)	t-test	P-value
Preoperative				
Mean±SD	3.89±0.37	4.01±0.44	1.349	0.803
Range	3.43-4.06	3.66-4.42		
After 1 month				
Mean±SD	2.05±0.23	2.04±0.22	0.260	0.155
Range	1.68-2.27	1.62-2.30		
After 3 months				
Mean±SD	2.19±0.24	2.09±0.23	1.129	0.672
Range	1.81-2.40	1.71-2.31		

t-Independent Sample t-test; p-value >0.05 NS

Table (5) shows no statistically significant difference between radiofrequency powered segmental ablation and endovenous laser ablation according to venous clinical severity score.

Table (6): Comparison between groups according to radiofrequency powered segmental ablation and endovenous laser ablation according to pain score.

Pain Score	RPSA (N=12)	EVLA (N=12)	t-test	P-value
Preoperative				
Mean±SD	2.13±0.23	2.27±0.25	0.879	0.523
Range	1.74-2.36	1.84-2.53		
After 2 wks				
Mean±SD	1.63±0.18	1.61±0.18	1.621	0.965
Range	1.29-1.85	1.24-1.86		
After 1 month				
Mean±SD	1.31±0.14	1.20±0.13	0.877	0.522
Range	1.01-1.50	0.89-1.41		
After 3 months				
Mean±SD	1.26±0.14	1.06±0.11	0.860	0.512
Range	0.94-1.49	0.72-1.20		

t-Independent Sample t-test; p-value >0.05 NS

Table (6) shows no statistically significant difference between radiofrequency powered segmental ablation and endovenous laser ablation according to pain score.

Table (7): Comparison between groups according to radiofrequency powered segmental ablation and endovenous laser ablation according to postoperative pain medication.

Postoperative pain medication	RPSA (N=12)	EVLA (N=12)	x ²	P-value
No medication	9 (75%)	8 (66.7%)	0.297	0.772
1-5 units	2 (16.7%)	3 (25%)	0.297	0.772
6-10 units	1 (8.3%)	1 (8.3%)	0.000	1.000
>10 units	0 (0%)	0 (0%)	0.000	1.000

x²: Chi-square test; p-value >0.05 NS

Table (7) shows no statistically significant difference between radiofrequency powered segmental ablation and endovenous laser ablation according to postoperative pain medication.

Table (8): Comparison between groups according to radiofrequency powered segmental ablation and endovenous laser ablation according to freedom from recanalization of great saphenous vein (GSV) observed by duplex ultrasound (DUS).

	RPSA (N=12)	EVLA (N=12)	x ²	P-value
At 0	12 (100%)	12 (100%)	0.000	1.000
At 1 month	11 (91.7%)	12 (100%)	0.297	0.772
At 3 months	10 (83.3%)	11 (91.7%)	0.297	0.772

x²: Chi-square test; p-value >0.05 NS

Table (8) shows no statistically significant difference between radiofrequency powered segmental ablation and endovenous laser ablation according to freedom from recanalization

of great saphenous vein (GSV) observed by duplex ultrasound (DUS).

Table (9): Comparison between groups according to radiofrequency powered segmental ablation and endovenous laser ablation according to post-operative bruises and ecchymosis and skin burn.

Post-operative bruises and ecchymosis and skin burn	RPSA (N=12)	EVLA (N=12)	x ²	p-value
At 0	2 (16.7%)	1 (8.3%)	0.300	0.589
At 1 month	0 (0%)	0 (0%)	--	--
At 3 months	0 (0%)	0 (0%)	--	--

x²: Chi-square test; p-value >0.05 NS

Table (9) shows no statistically significant difference between radiofrequency powered segmental ablation and endovenous laser ablation according to Post-operative bruises and ecchymosis and skin burn.

DISCUSSION

The ideal treatment for lower extremities primary varicose veins should be relatively noninvasive, repeatable if necessary, relatively safe and free from significant complications, effective in eliminating points of leakage, cost effective, cosmetically acceptable and obviate the necessity for extended periods of unemployment or absence from usual daily activities⁽⁸⁾.

Surgical treatment in the form of disconnection of the sapheno-femoral junction (SFJ) along with stripping of the great saphenous vein (GSV) and multiple phlebotomies is considered the standard treatment of varicose veins⁽⁹⁾. Excellent results are achieved as long as every source of reflux is eliminated.

There are newer techniques available to destroy the GSV in the thigh, without physically removing the vein by stripping. The alternative techniques in common use are radiofrequency ablation (RFA) and endovenous laser ablation (EVLA). There is now reasonable

evidence that radiofrequency ablation is a slightly superior procedure especially for perioperative bruising and pain when compared with endovenous ablation⁽¹⁰⁾.

Twenty four patients were included in our study, 12 patients underwent RFSA, of which there were 3 male (25%) and 9 female (75%) and 12 patients underwent EVLA, of which there were 4 male (33.3%) and 8 female (66.7%)

There was no significant difference between radiofrequency powered segmental ablation and endovenous laser ablation according to demographic data.

All patients were symptomatic for their venous problems, with or without skin changes. The majority were in the C3 group of the CEAP classification (8 (66.7%) patients in RPSA surgery group and 8 (66.7%) in RFA group, followed by C2 (3 (25%) patients in RPSA group and 2(16.7) patients in EVLA group), and C4 (1(8.3%) patient in RFA group and 2 (16.7%) patients in EVLA group).

Our study shows no statistically significant difference between radiofrequency powered segmental ablation (40.95±6.14) and endovenous laser ablation (38.85±5.83) according to length of treated vein (cm).

Our study shows no statistically significant difference between radiofrequency powered segmental ablation 12 (100%) and endovenous laser ablation 12 (100%) according to GSV with incompetent terminal valve.

Our study shows highly statistically significant decrease severity score through the periods in group radiofrequency powered segmental ablation and group endovenous laser ablation.

Our study shows no statistically significant difference between radiofrequency powered segmental ablation and endovenous laser ablation according to pain score.

Our study shows highly statistically significant decrease pain score through the periods in group radiofrequency powered segmental ablation and group endovenous laser ablation.

Our study shows no statistically significant difference between radiofrequency powered segmental ablation (no medication) 9 (75%) and endovenous laser ablation (no medication) 8 (66.7%) according to postoperative pain medication.

Our study shows no statistically significant difference between radiofrequency powered segmental ablation At 0 12 (100%), At 1 month 11 (91.7%) and At 3 months 10 (83.3%) and endovenous laser ablation At 0 12 (100%), At 1 month 12 (100%) and At 3 months 11 (91.7%) according to freedom from recanalization of great saphenous vein (GSV) observed by duplex ultrasound (DUS).

Our study shows no statistically significant difference between radiofrequency powered segmental ablation At 0 2 (16.7%), At 1 month 0 (0%) and At 3 months 0 (0%) and endovenous laser ablation At 0 1 (8.3%), At 1 month 0 (0%) and At 3 months 0 (0%) according to Post-operative bruises and ecchymosis and skin burn.

CONCLUSION

Endovenous GSV ablation with Closure Fast and 1470-nm EVLA with RTF had similarly short term outcomes and were equally effective clinically with durable gains in disease-specific QOL. The treatments were equally associated with minimal postprocedural pain scores and short recovery times.

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