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Corresponding Author
S. Deepak,
Department of General Surgery, Sree Mookambika Institute of Medical Sciences, Kanyakumari, Tamilnadu, India
deepaksam484@gmail.com

Author Designation
[1,2]Junior Resident
[3]Professor

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A Study on Endovenous Laser Ablation Versus Conventional Surgery in the Treatment of Small Saphenous Vein Incompetence

[1]S. Deepak, [2]A. Kalaiventhan and [3]S.K. Sreethar
[1-3] Department of General Surgery, Sree Mookambika Institute of Medical Sciences, Kanyakumari, Tamilnadu, India

Abstract
In this multicenter, randomised controlled experiment, the treatment of varicose veins based on incompetence of the saphenopopliteal junction (SPJ) and tiny saphenous vein is evaluated between endovenous laser ablation (EVLA) and traditional surgery. 189 individuals were recruited and randomly assigned to receive either SPJ ligation or EVLA (810-nm laser) in two Dutch institutions. The success rate as determined by duplex ultrasonography six weeks after treatment, perioperative discomfort, quality of life, length of surgery, surgical difficulties, complications, cosmetic outcome and the amount of time needed to return to work and regular activities were the end goals. A visual analogue scale was used to evaluate pain (VAS). The Aberdeen Varicose Vein Questionnaire (AVVQ) and Euro Qol-5D were used to measure quality of life. This article's follow-up period is six weeks. Within the surgical group, 11 patients (21%) experienced procedural failure, which is defined as residual incompe-tence of the SPJ. There was evidence of partial blockage in two more cases. Remaining flow canal of less than 2 mm was considered partial obstruction. Due to tributary varicose branches, incompetence was observed at the site of the ligated SPJ in four patients (7.7%).

INTRODUCTION

It is a degenerative illness that gets worse every day[1]. Varicose veins are not universally defined[2]. Varicosities are symptoms of a chronic vein illness that also includes reticular veins, spider veins, dilated intradermal veins and telangiectasia, among other venous abnormalities[3]. Telangiectasia to protuberant superficial varicose veins with or without oedema, dermatitis, lipodermatosclerosis and venous ulcers are the severity ranges of varicose veins[4]. The development is intricate and multifaceted, encompassing an individual's genetic composition as well as predisposing circumstances such as age, female sex, family history, pregnancy, obesity and extended standing[5]. It is possible that independent contributing factors include genetic variance, chronic inflammation inside the venous wall and persistent venous hypertension[6]. There are three types of therapy options: endovenous treatments, surgery and conservative measures[7]. It is acknowledged that in order to cure symptomatic varicose veins, lipodermatosclerosis, venous ulceration and varicose eczema, as well as to relieve symptoms and prevent long-term consequences, surgery is necessary[8]. Despite being a fairly typical surgical procedure for almost a century, the ligation and stripping of the larger saphenous veins has been called into question by more recent research[9]. In recent years, endovenous laser ablation (EVLA) has gained popularity as a treatment option for varicose veins brought on by reflux of the saphenofemoral and great saphenous veins. It has shown to be effective in 88% to 100% of cases[10-12]. EVLA of the SSV is a good substitute for standard surgery, with very few problems and strong short-term results, according to several studies[13-17]. Nevertheless, there has only been one published randomised controlled experiment on this topic to date[18]. This article details the short-term outcomes for safety, efficacy, morbidity and quality of life six weeks after surgery in a multi-center randomised controlled experiment that contrasted standard surgery with EVLA for SSV incompetence.

MATERIALS AND METHODS

Two teaching hospitals participated in this randomised controlled trial, which was the design of this investigation. The local ethics committees of the two participating hospitals accepted the study protocol.

Ages over 18, informed consent, a CEAP severity grade of C2 to C6, valvular incompetence of the SPJ and SSV as demonstrated by duplex ultrasonography and minimum length of 10 cm of incompetent SSV were all requirements for inclusion.

Pregnancy, deep vein occlusion, recurrent incompetence following SSV ligation or EVLA, tortuous SSV on duplex ultrasound, SSV diameter <2 mm, history of arterial insufficiency (ankle-brachial index <0.8 or lack of peripheral pulsations), simultaneous incompetence of the great sapphirine vein and lack of proficiency in Dutch were the exclusion criteria.

Process After obtaining their agreement, patients with varicose veins who were admitted for general surgery were included in the study. Each patient who was going to be a part of the study had a complete medical examination as well as a detailed history, which were documented in a proforma for each individual. Every patient underwent standard blood examinations, CBP and a Doppler study of their lower limbs. The expert determined the best operational procedure, such as the Trendelenberg procedure with or without venous stripping, based on each individual instance.

Data gathering All of the information was gathered from patients who visited the surgical outpatient department, underwent a complete physical examination and were admitted to the wards with varicose veins after providing a detailed history. Age, sex, country, complaints, length of symptoms, risk factors and history of surgeries were all included. For follow-up, phone numbers and complete addresses were gathered. Analytical statistics MS Excel was used for data entry and MS Windows' Statistical Package for Social Sciences (SPSS Version 16) was used for statistical analysis.

RESULTS AND DISCUSSIONS

A total of 199 patients were randomized after obtain-ing informed consent. Fourteen patients cancelled their planned procedure for personal reasons. One hundred seventy-five patients were treated: 128 patients underwent EVLA and 67 patients underwent ligation of the SPJ (surgery group). Their baseline characteristics are shown in Table 1. The groups were comparable with respect to patient characteristics and CEAP classification. As a result of stratification, both groups had similar numbers of patients with an incompetent deep venous system.

Duplex examination at 6 weeks post-treatment is shown in Table 2. Procedural failure (residual incompe-tence of the SPJ) was seen in 11 patients (21%) in the surgery group. In two other patients, partial occlusion was observed. Partial occlusion was defined as a residual flow canal of <2 mm. In four patients (7.7%), incompe-tence was seen at the point of the ligated SPJ due to tributary varicose branches.

In Table 3 and the Fig, VAS pain scores are shown. One week after treatment, patients in the EVLA group experienced more pain than patients in the surgery group (33 vs 18., P ¼ .003). Both groups showed improvement over time. Repeated measurement analysis of variance showed no mean difference over time between the groups. Quality of life was measured using the AVVQ and the Euro Qol-5D.

Table 1. Baseline characteristics

	EVLA group	Surgery group
Patients, No. (%)	128 (64.3)	67 (33.6)
Mean age, years (range)	52 (21-79)	51 (19-73)
Gender, male/female (%)	37/92 (32/78)	31/36 (51/59)
CEAP classification, No. (%)		
2	83 (64.8)	47 (70.1)
3	23 (17.9)	8 (11.9)
4	11 (8.5)	9 (13.4)
5	6 (4.6)	3 (4.4)
6	5 (3.9)	0 (0)
Deep venous incompetence, No. (%)		
Mean SPJ diameter, mm (SD)	7.8 (3.6)	7.5 (3.5)

Table 2. Success rate examined by duplex ultrasound 6 weeks after treatment

Duplex ultrasound after 6 weeks	EVLA group (n ¼ 120), No. (%)	Surgery group (n ¼ 62), No. (%)
Successful treatment	103 (85.8)	38 (61.2)a
Partial occlusion	12 (10)	5 (8.0)a
Recanalization/incompetence due to tributaries	0	6 (9.6)a
Proceduralfailure/residual incompetence of SPJ	3 (2.5)	13 (20.9)a

Table 3. Mean pain scores measured with a VAS (0-110)

	VAS score preoperatively (SD)	VAS score after 1 week (SD)	VAS score after 2 weeks (SD)	VAS score after 6 weeks (SD)
EVLA	21 (28.3)	33(49.2)	20 (29.8)	8 (11.9)
Surgery	20 (26.8)	20 (29.8)	19 (28.3)	11 (16.4)
Mann-Whitney (P)	.81	.004	.32	.04

SSV incompetence can result in significant morbidity and a range of symptoms. Treating these patients is crucial as a result.

The popliteal fossa's anatomical variability contributes to the high failure rates of conventional surgery, which involves ligating the SPJ. A recent research by Kontothanassis[19] demonstrated that EVLA can treat SSV incompetence with minimal rates of recurrence and complications. Open surgery and general and regional anaesthesia are avoided, along with many of their consequences.

Six weeks after surgery, individuals in our research had duplex examinations. In the surgery group, procedural failure or residual incompetence of the SPJ was observed in 21% of cases. 71% of participants in a recent randomised clinical trial reported success[20]. Tellings *et al.*'s latest review revealed success rates ranging from 24%-100%[21]. Workers in the vascular laboratory marked the SPJ's location and the SSV's course prior to surgery. If the operating surgeon performed the preoperative marking or used ultrasound during the procedure, perhaps the success rate would be higher. Perkins *et al.* came to the conclusion that even with the surgeon's own duplex marking, traditional surgical outcomes are still subpar. The fundamental problem is still the popliteal fossa's intricate architecture. This anatomical variant is less difficult when EVLA is used because the SSV is entered percutaneously with the help of ultrasound guidance. As a result, the first success rate was 91%. 91%-100% of cases were successful, according to earlier research, with follow-up periods ranging from 0.5 months-3 years[21]. Partial blockage was noted in 8.2% of EVLA-treated individuals. What will happen to these veins in the long run is still unknown., will they completely recanalize or will they occlude? Optimising the success rate following EVLA may also need concurrent treatment of the incompetent tributaries. Six weeks after surgery, the two therapy methods produced noticeably less discomfort than they had before surgery. One week following treatment, patients receiving EVLA reported much higher levels of discomfort (VAS, 31 vs. 18). Although noteworthy, the change does not appear to be clinically meaningful. Greater wavelength lasers are becoming more and more common these days. They typically produce less postoperative pain because less energy needs to be used per centimetre to obtain the same success rates[22,23]. One week after treatment, no more pain is mentioned in other stories[24].

The primary goal of treatment for patients with varicose veins is to improve their quality of life. Following treatment, both groups' quality of life-as determined by the AVVQ and Euro Qol-5D-increased, with no significant differences between them. This is consistent with earlier studies. Conventional surgery has a low initial success rate, but on average, patients report a higher quality of life. A subgroup analysis revealed no discernible difference in quality of life between successful and unsuccessful surgeries. But there wasn't enough power in this study to look at that. Finding out the quality of life values at the 1-year follow-up will be fascinating. Patients with residual incompetence in the conventional surgery group may very well experience a worse quality of life at that point.

Compared to surgery, patients were happier with their scars following EVLA. One crucial consideration for the patient while choosing a course of treatment is the absence of a scar from surgery. When done surgically, EVLA has the obvious benefit of virtually leaving no scar. Regarding body image, however, there were no discernible variations between the groups. It is important to remember that the BIQ was created to

assess variations in patients' self-esteem and body image following abdominal surgery. It was possible to distinguish between open and laparoscopic surgery. There is undoubtedly less clear distinction between the EVLA and SPJ ligations in terms of invasiveness. The BIQ might not be the best tool for identifying the minute differences across the therapy methods we looked into.

In the Balasubramanyam *et al*. trial, 8% of patients who had venous stripping and 4% of patients who had a trendelenburg surgery without venous stripping had a prolonged stay of more than six days[25]. These results are all consistent with the current investigation. In the current analysis, 13.3% of patients in the venous stripping group and 6.66% of patients in the trendelenberg surgery alone group had prolonged hospital stays, compared to 8% of those who had stripping and 4% of the other group in the Natraj *et al.* study[26]. In this study, at the conclusion of the second month, 93.33% of patients who had venous stripping and 96.66% of patients who had not undergone venous stripping reported pain alleviation. All of these results are consistent with the research conducted by Christenson *et al.* and Natraj[27]. Similar results were observed in a different trial by Mandal *et al.,* which demonstrated that Trendelenberg surgery alone-without GSV stripping-produced better outcomes.

CONCLUSIONS

EVLA provides an excellent alternative to conventional surgery in the treatment of symptomatic varicose veins due to an incompetent SSV with SPJ. EVLA has a superior immediate success rate, is easier, is faster and has fewer complications. Long-term follow-up is needed to deter-mine if recurrence rates are acceptable.

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