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Outcome of High Ligation combined with stripping and endovenous laser ablation of the great saphenous Vein: an early results of a single center Study

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Abstract

Introduction: The classic intervention for saphenous vein varicosity has been Saphenous femoral junction ligation with stripping. But now endogenous laser ablations are recommended over surgery.

Method: This is the retrospective study of 122 patients, conducted for the period of one year in the department of Cardio Thoracic and Vascular Surgery of Bir Hospital, Nepal.

Results: Out of 122 cases, 84 were of Endovenous Laser Ablation, 31 cases Ligation and Stripping and 8 cases of sclerotherapy with complete success rate in all group. There was a one case of deep vein injury in Liagtion and Stripping group and one case of skin burn in Endovenous Laser Ablation group, along with other minor injuries.

Conclusion: Both group have complete success rate however, hospital stay of patients in Endovenous Laser Ablation group was shorter and reassumed daily activities earlier.

Keywords: Laser Ablation, saphenous vein varicosity, radiofrequency ablation

Introduction

Varicose veins are dilated, tortuous superficial veins (varices) which usually affect the lower extremities. There are two main superficial venous systems, the great (GSV) and small (SSV) saphenous veins and their tributaries. Endoluminal procedures, in particular endovenous thermal vein ablation, are nowadays an established component in the treatment spectrum of varicose veins. But in Nepal, especially in our hospital we have recently started using laser ablation for the treatment of the varicose of the lower limbs. In western world, thermal vein ablation is even given preference over stripping operations due to the high effectiveness, application safety, and high patient satisfaction ^[1].

The most widely used procedures are radiofrequency ablation (RFA) and laser ablation (EVLA). The RFA and EVLA procedures were both introduced in 1998/1999 and initially used with low wavelengths (EVLA) and low temperatures (RFA). The EVLA procedure was first used with bare fibers and a wavelength of 810–980 nm, and an improvement in effectiveness and reduction of side effects could be achieved with the introduction of radial fibers and lasers with higher wavelengths. The introduction of higher temperatures and segmental ablation also brought improvement in the effectiveness and tolerability of RFA ^[2]. In our hospital we are using EVLA for the treatment of the varicose of lower limbs and the first EVLA in our hospital was on August 2018.

The great advantage of endoluminal procedures in contrast to stripping operations is that they are minimally invasive. The next day, patients can undertake normal physical activities often including sport, and as a rule with no impairment due to the previous endovenous operation. Despite these undeniable advantages of endoluminal procedures, in recent times there has been increasingly more support for high-ligation and stripping, as the gold standard for treatment of varicose veins, because it leads to less saphenofemoral recurrences detected by duplex ultrasound (DUS) after 5 years in comparison to endothermal procedures ^[3]. This is particularly due to the fact that the currently available long-term data for endovenous thermal procedures are still taken from studies carried out during the initial stages of EVLA and RFA treatment ^[4]. These procedures worked in particular with too little energy or imprecise catheter positioning;

however, long-term analyses on the clinical success (not saphenofemoral recurrence detected by DUS!) showed no significant differences between HL+S and thermal procedures [5].

It is now known that a long residual saphenofemoral stump promotes recurrence [6]. It is also known that in endovenous procedures, recurrence preferentially occurs via the anterior accessory saphenous vein (AASV) [7].

Therefore, the trend is towards an endovenous crosssection, i.e., the treatment of the long saphenous vein is carried out up to the saphenofemoral junction, which again was not previously possible with bare fibers but which is no longer a problem with the modern radially radiating laser fibers and modern RFA techniques [8].

Methods

This is the hospital based retrospective study, carried out over the period of 1 year from April 2019 to March 2020 in CTVS, department of surgery Bir Hospital, Nepal.

Total of 122 patients with varicosities of lower limbs who underwent surgery either EVLA or L&S of GSV were taken for the study. We excluded patients who had previously treated for varicosities of lower limbs.

Procedure Details

After evaluating the patients, all the needed investigations were performed. In the Operation Theater (OT), patients were positioned in supine. We have not started EVLA under local anesthesia using tumescent solution. So all patients were given spinal anesthesia. GSV was punctured at the medial aspect of the leg above the medial malleolus. After puncturing the GSV, guide wire was passed through the punctured needle. Sheath was passed along the guide wire and adjusted about 4cm from the SFJ. Then laser fiber passed via sheath and positioned about 1 cm from the tip of the sheath.

Finally, laser of 10 watt and 80 Joules were fired at every one centimeter till the laser fiber come out. For the small varicosities branches sclerotherapy with Sodium Tetra Decyl (STD) 2% was done. Crepe bandage applied from foot to thigh and patient transferred to post-operative ward. Most of the patients were discharged the following day.

Ligation of SFJ and stripping of GSV was done as by a standard method under spinal anesthesia. In 7 cases where the SFJ was competent and the varicosity of grade 2 only sclerotherapy with STD 2% was done.

Patient were advised to follow up in CTVS OPD after one week and then after 3months. In the OPD any complications were evaluated.

Data collection

Total of 122 cases, who were treated for varicosities either by EVLA or open surgery by SFJ ligation were taken for the studies. Approval from Subject Committee and Institutional Review Board of National Academy of Medical Sciences taken prior to study. Data were collected from the surgery registers. Confidentiality was assured by not disclosing the information and maintained by coding the data with number.

Results

Total of 122 cases of patients with varicose vein of lower limb who underwent surgery during one year of duration were taken for the study. Out of these, 77 (63.11%) were male patients and 45 (36.89%) were female patients as shown in Table 1.

Table 1: n=122

Variables	Frequency	Percentage
Male	77	63.11
Female	45	36.89
Total	122	100

Initially when we started treating the varicose vein of lower limbs with EVLA, the number were few. But gradually the number of EVLA surgery increased and exceeded the open surgery ie SFJ ligation and stripping of GSV (L&S) as shown in Table 2. Most of the L&S were done because of the patient's preference or due to financial constrain. One case planned for EVLA was converted to (L&S) due to unable to puncture the vein because of thin and small diameter of the GSV.

Table 2: Cases according to month n=122

Months	Types of Surgery			Cases
	EVLA	L&S	Sclerotherapy	
April	2	3	1	6
May	4	7	2	13
June	10	3	1	13
July	9	5	3	18
August	11	5	-	16
September	8	2	-	10
October	6	-	-	6
November	13	1	-	14
December	6	1	-	7
January	5	2	-	7
February	7	1	-	8
March	3	1	-	4
Total	84	31	7	122

Out of the 122 cases EVLA was done in 84 (68.85%) patients out of which 54 (44.26%) were male and 30 (24.59%) were female. Similarly L&S of GSV done in 31(25.40%) patients out of which 20 (16.39%) were male and 11 (9.01%) were male. Sclerotherapy was done in 7(5.73%). (Table 3)

Table 3: Types of surgery male female total

Types of Surgery	Male	Female	Total
EVLA	54(44.26%)	30(24.59%)	84(68.85%)
L&S	20(16.39%)	11(9.01%)	31(25.40%)
Sclerotherapy	3(2.46%)	4(3.28%)	7(5.73%)

Both limbs were equally affected by the varicosity. We treated the varicosity of right lower limb in 56(45.90%) cases, left lower limb in 58 (47.54%) cases and varicosity of bilateral limb in 8(6.56%) cases. (Table 4)

Table 4: Surgery according to site n=122

Types of Site	Frequency	Percent
Varicosity Right lower limb	56	45.90
Varicosity Left lower limb	58	47.54
Bilateral varicosities of lower limb	8	6.56

There was a overall complication of 22(18.03%) out of which in EVLA group the complication was 14(16.67%) and in S&L group 8(25.80%).

All were minor complications except there was a case of deep femoral vein injury in L&S of GSV. There was no case of Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE) in both all groups. (Table 5)

Table 5: Complications of the varicose vein surgery

Complication	EVLA (n =14)	L&S (n =8)
Brusing	4 (44.44%)	-
Hematoma	-	3 (37.5%)
Phlebitis	2 (14.28%)	-
Induration	5 (35.71%)	2 (25%)
Paraesthesia	2 (14.28%)	1 (12.5%)
Skin burn	1 (7.14%)	-
Deep femoral vein injury	-	1 (12.5%)
Wound infection	-	1 (12.5%)
DVT	-	-
PE	-	-

Discussion

For treatment of saphenous vein varicosity with incompetent SFJ, the classic and most recognized intervention has been surgical ligation with or without stripping [9]. The advantage of ligation alone is the perseverance of the vein for possible future bypass procedures, but this method has a high recurrence rate (45%-71%). Stripping with ligation is associated with an excellent early outcome because the incompetent vessel is totally removed and it is more accepted due to lower recurrence rates (18%-29%). However, it has more scarring, pain, and paresthesia at the stripping site compared to ligation alone [10].

In 1999, the first report on EVLA appeared in the literature. Using an 810 - nm diode laser, Bonè first reported the delivery of endoluminal laser energy for the treatment of the insufficient GSV [11].

We first did EVLA on 10th August 2018 in our hospital but then due to some technical problems we couldn't continue doing EVLA. We restarted doing EVLA only from April 2019. But once we started doing EVLA, we gradually increased the number and as early as on third month, the number of EVLA exceeded the number of L&S of GSV.

In our study male dominated 61.11% compare to female 36.89% in both group of EVLA and L&S group. Contrast to our study, in other studies however female (71%) dominated [12]. EVLA was done in 68.85% cases and L&S in 25.40% cases in our study.

To ablate GSV, endovenous ablations are recommended over surgery as a new standard treatment [13]. The benefits over open surgery are less postoperative pain, a lower rate of surgical site infection, faster return to normal activities and work. However, they are accompanied by higher equipment costs. Therefore, many techniques of endovenous ablation have emerged including endovenous laser ablation (EVLA), radio frequency ablation (RFA), endovenous steam ablation (EVSA) and ultrasound-guided foam sclerotherapy (UGFS) [14]. Study done by Alder show high success rate of 99% by EVLA with very low recanalization [15]. It is similar to our study. We have a complete success rate in our study may be because of short term follow up. The major part of the published studies report a success rate of about 100% at a distance of one week after the procedure. This success rate decreases over time, but remains over 90% in a large number of case series [16].

There was a complication of 15.67% EVLA group and 25.67% in L&S group. Majority of the complications were minor. These findings are higher than the study done by Mazayshvili where the complication was 4.87% [17]. This may be due to the newer modality of treatment for us. In our study there were no major complication like DVT and Pulmonary Embolism (PE) in all groups. However there was an injury to deep femoral vein in a patient who was treated with L&S. It was transected which was repaired at the same setting with a vein patch. Its not common to have an injury to major vessels during L&S. Balzaer found the

incidence of injury to the major vein to be 0.3% [18]. Similarly there was skin burn 1.12% in EVLA group in our study which is also higher than study done by Mazayshili where the skin burn is 0.07%. The other minor injuries in EVLA group are induration 5(35.71%), bruising 4(44.44%), paresthesia 2(14.28%), similarly in L&S group hematoma 3 (37.5%), induration 2(25%), paresthesia 1(12.5%), wound infection 1(12.5%).

These findings are similar to the study done by Dexter *et al.* where the complications are induration 13.4%, ecchymosis 11%, paresthesia 3%, thrombophlebitis 2% [19, 20].

They all found the incidence to be low, between 0.002% and 0.3%, for both arterial and venous injuries together.

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Patients who were treated with EVLA were discharged the same day or the following day, the average post-surgery stay was one day. However all the patients but one who were treated with L&S were discharged on second post-operative day. One patient who was treated with L&S, had an injury to deep femoral vein. His post-surgery hospital stay was 30 days. Patients of EVLA group resumed to daily activities earlier than the L&S group.

Conclusion

Both EVLA and L&S of GSV have complete success rate with mostly minor complications. However hospital stay of patients in EVLA group was shorter than the patients of L&S group, they also reassumed daily activities earlier. Postoperative pain and quality of life was better in EVLA group.

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