

Varicose Veins—Current Treatment Options

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Received date: April 17, 2023, Manuscript No. IPJVES-23-16509; **Editor assigned date:** April 19, 2023, PreQC No. IPJVES-23-16509 (PQ); **Reviewed date:** May 01, 2023, QC No. IPJVES-23-16509; **Revised date:** May 09, 2023, Manuscript No. IPJVES-23-16509 (R); **Published date:** May 17, 2023, DOI: 10.36648/2471-9943.8.3.155

Citation: Arora M, Arora S (2023) Varicose Veins—Current Treatment Options. J Vasc Endovasc Therapy Vol.8 No.3:155.

Abstract

The last decade has been like a crusade in the treatment of varicose veins, one after the other new development, advances in techniques each method claiming to be better than the other. This study is about discussion of all the modalities of treatment for a patient population of around 1500 cases, ranging from CEAP 3 to 6 all treated by various endovenous ablation methods. Treatment was carried out in primary varicose veins, including patients with recurrent varicosities. The age group included 25 to 65 years of age, no comorbidities were ruled out for treatment. Patients with recurrent superficial thrombophlebitis were worked up preoperatively for prothrombotic conditions, which if positive, were not treated for varicosities.

A comparative study showed that all methods produced a reasonably effective means of closure of axial veins long and short saphenous with minimal complications in the long and short term. Methods varied in the ease of procedure, patient comfort, versatility of use in different areas and in recurrence.

Keywords: Varicose veins; Endovenous; Laser; RFA; Cyanoacrylate; Sclerotherapy; Veins

Introduction

Varicose veins are the main nomological form of chronic venous insufficiency, present in a large subset of population. Though the common symptoms of pain and discomfort may be present only in 7% of population, cross-sectional studies have shown that junctional reflux is much more prevalent and observed in about 39% of subjects; more common in females [1]. Various risk factors associated with venous insufficiency include female sex, prolonged standing/sitting, pregnancy, certain occupations (like traffic policemen, farmers, teachers and chefs), hormonal influence, obesity, family history and advanced age [2].

Recent years have witnessed an avalanche in the treatment options available for the condition, most of which are directed at stopping the reflux, at the sapheno-femoral junction or sapheno-popliteal junction. Our surgical ability to stop the reflux

has been found crucial in reducing symptoms of the condition and preventing recurrences [3].

Some of the treatments discussed in the study are Radiofrequency Ablation (RFA), Endovenous Laser Ablation (EVLA) and Cyanoacrylate glue (VenaSeal) along with ultrasound guided foam sclerotherapy.

Radiofrequency Ablation (RFA) for chronic venous disease is an ablation technique which emits thermal energy through an electrode that maintains a constant temperature of 120 degrees Celsius in the veins, transferring the same; through conduction of heat from lumen to the intima and wall of veins. As a result, this thermal coagulation damages the veins walls, inducing obliteration and fibrosis of veins. The technique has been named RFA for its mechanism of using electromagnetic field energy generated by alternating the current generated inside the catheter. However, the energy transmitted to the tissues is not actually electro-magnetic field energy, but instead conduction of heat from a heated catheter [4].

Endovenous Laser Ablation (EVLA) uses thermal energy generated by laser to ablate the vein. Earlier lasers used shorter wavelengths which had high level of hemoglobin absorption causing more heat retention in the area. Present lasers use longer wavelength, which has higher level of water absorption causing vein ablation at lower temperatures thus minimizing the incidence of paraesthesia and thermal burns [5].

Cyanoacrylate glue (VenaSeal) polymerises in contact with fluid or blood and gets cast in the vein, thereby sealing it. The glue gets degraded in the body slowly over the next couple of years. It causes necrosis of endothelium on direct contact. Over the next few weeks chemical reactions of cyanoacrylate take effect causing an inflammation of the vein wall which is followed by the last phase wherein a foreign body type of reaction causes fibrosis and kind of auto digestion of the vein over a long period of time [6].

Case Presentation

A retrospective analysis of 1500 patients who underwent treatment of varicose veins at a multispecialty tertiary care private hospital in Abu Dhabi, UAE over 7 years (2016-2022). The age group was 25-55 years, 60% were males and 40% females. All patients were followed up for at least 1 year post-procedure

(mean 2.2 years; range 1-5 years). The various treatment methods performed were laser ablation, radio-frequency ablation, cyanoacrylate glue ablation and stab avulsions with injection sclerotherapy. Patients were assessed by venous doppler examination, CEAP scores and venous clinical severity scores. Mean CEAP score was 4-5. Reflux time was above 0.5 milliseconds and vein size was above 4.5 mm.

Inclusion criterion for treatment were

- Junctional reflux of more than 500 milliseconds
- Size of vein more than 4.5 mm
- Perforator reflux
- CEAP of 4 to 6
- Age between 25 years to 55 years

Exclusion criterion was only one-

- Secondary varicose veins

Patients were not excluded from the study on basis of comorbidities. Those with recurrent superficial thrombophlebitis were worked up pre-operatively for prothrombotic conditions (thrombophilia), which if found positive, appropriate medical management was offered, and thus excluded from this analysis of surgical techniques.

Results and Discussion

Out of 1500 patients that were treated and followed up, 500 of these were radiofrequency ablations, 800 were nonthermal

cyanoacrylate ablation and 200 were EVLA using the latest fibers with lower temperatures. USG guided foam sclerotherapy done at the same time as the main procedure for reticular and spider veins. Branches from the main truncal veins were also treated with either sclerotherapy or stab avulsions or sometimes local cyanoacrylate glue injections.

RFA accorded good vein closure (99% success) in the first 48 hours post-procedure which dropped down to 85% by 6-12 months thereafter. For laser treatment the immediate, intermediate and long term results were marginally better than RFA. Cyanoacrylate however, showed comparable immediate closure rates but the long term vein closure rates were better than the previous two techniques. Though inflammation of the veins between the 7th and 10th day of treatment caused some pain and discomfort with cyanoacrylate, this was much lesser than the discomfort of tumescent fluid, ecchymosis and occasional numbness from treating by the thermal techniques.

There were no major complications like embolism or DVT for any of the patients, all procedures were safe and comparably effective in reducing the symptoms of varicose veins and improving the quality of life (**Table 1**). Results are presented below in tabulated form for each modality (**Table 2**).

Table 1: Results of RFA, EVLA and Cyanoacrylate.

	At 48 hours			At 7days			At 6 months			At 12 months		
	RFA	EVLA	Cyano-acrylate	RFA	EVLA	Cyano-acrylate	RFA	EVLA	Cyano-acrylate	RFA	EVLA	Cyano-acrylate
Total Number	500	200	800	500	200	800	500	200	800	500	200	800
Vein closure	495	198	796	494	99	796	425	188	795	85	90	786
Ulcer healing %	-	-	-	80	81	83	95	96	99	90	91	98
Post-Op pain	50	24	40	15	14	80	5	2	0	1	1	0
Vein visibility reduction %	400	168	704	425	168	720	442	178	770	460	181	787
VCSS score Improvement %	400	150	682	425	160	684	450	177	776	452	184	784
Sick leave (days off work)	03-May	02-Apr	02-Apr	6	3*	10*	0	0	0	0	0	0
				* Requirement beyond 7 days								

Table 2: Comparison of Thermal and Non-Thermal methods.

	Thermal	Non-Thermal
Time of treatment	42-57 minutes on an average for bilateral legs	45 minutes
Variability of use	Only on long saphenous and accessory saphenous vein above the knee	Long and short saphenous, accessory saphenous, anteromedial and posterolateral veins
Postoperative pain	Score of 3/10 on an average	Score of 2-3/10
Recurrence in 6 months	Less than 5%	Less than 1%
Thrombophlebitis	Around 5%	Around 8%
Cost of treatment	Cost of equipment	Cost of repeated consumables
Sick leaves treatment	3-4 days	2-3 days
Need accompanying procedures	Needs stab phlebectomy and sclerotherapy below the knee	Just sclerotherapy for the reticular veins
Complications	Less than complications 1% major	No major complications

By comparison, thermal methods showed more instances of intraoperative and postoperative pain or paresthesia than the nonthermal methods. Chances of recurrence were found to be much lesser with nonthermal cyanoacrylate glue.

Ease of treatment, variability of use at different sites and for different veins added value to the method as it was not required to add other procedures to complete the treatment (**Table 3**).

Table 3: Comparison of RFA versus Cyanoacrylate glue.

Radiofrequency	Cyanoacrylate glue
Long metal tip, so easy visibility	Plastic tip, makes it less easy to visualize
Long metal tip makes it difficult to use when veins are more tortuous	More pliable than closure-fast tip
Requires tumescent anesthesia which consumes time, causes more bruising and makes the leg heavy, though provides postoperative anesthesia	No tumescent anesthesia required Problem of glue—too less or too much
Chances of postoperative bleeding from entry site are higher	Incidence of postoperative bleeding less than 1%
Requires wearing of stockings for 1 month	No need to wear stockings, though it does help if combining with sclerotherapy

Conclusion

A comparative analysis showed that all methods produced a reasonably effective means of closure of axial veins long and short saphenous with minimal complications in the long and short term. Methods differed in the ease of procedure, patient comfort, versatility of use in different areas and in rates of recurrence.

For truncal veins, closure is best achieved by cyanoacrylate, EVLA and RFA in that order. Chances of recurrence at 5 years are 1% in cyanoacrylate 10% in EVLA and 15% in RFA.

- Postoperative comfort is best with cyanoacrylate glue, non-thermal methods; EVLA and RFA are equal in terms of postoperative pain, ecchymosis or paresthesia.
- Chances of heat induced DVT, paresthesia or numbness due to nerve injury are more common with RFA and EVLA especially

in more superficial veins. Hence, they cannot be used below the knee and should be used with caution for short saphenous veins.

- Variability of use is best with cyanoacrylate; it can be used for short saphenous, accessory saphenous, anterolateral vein, doubled long saphenous vein and vein of Giacomani. Though EVLA and RFA can be used for perforator veins the procedure is arduous and long term recurrences are common.

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