

Varicose Veins: Have We Reached the Heights

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Varicose veins are quite common and affect a large population. In the initial phase they are associated with cosmetic problems but as the diseases progresses, it can affect the quality of life especially when patients develop the venous ulcer which are really hard to heal.

Until few decades back, the surgery of Sapheno-femoral or Sapheno-popliteal obliteration with or without stripping of the vein was a standard operation. But this operation required general or regional anaesthesia. The complications associated with this procedure were bleeding, hematoma, and ecchymosis. Further there may be injury to saphenous and sural nerve when working in the lower part of leg.

The physicians all over the world were looking for minimal invasive treatment for all pathologies so came the era of less invasive treatment for varicose veins. They are associated with less morbidity compared with open surgery. The minimal invasive surgery reduced the post operative pain. Further they could be carried out under local anesthesia so making it a day care surgery. They improved the quality of life and were associated with less complication rates.

As these techniques need the Tumescant anesthesia as they are thermal based and can lead to thermal injuries to the surrounding structures so recently, new Non-Thermal, Non-Tumescant (NTNTs) treatments like sclerotherapy, Mechanochemical ablation and Glue treatment have been introduced so that the complications associated with thermal ablation are avoided.

The varicose veins are graded as per CEAP classification which is Clinical, Etiological, Anatomical and Pathophysiological. The clinical grading is most important which varies from C0 to C6. Before planning any intervention in varicose veins, Duplex mapping is mandatory. Duplex ultrasound assesses the morphology and haemodynamic of lower limb veins. This is very important to note on Duplex whether the deep venous system is patent or blocked as the treatment depends on the status of the Deep veins. Endovenous thermal ablation includes Endovenous Laser Ablation (EVLA), Radio Frequency Ablation (RFA), Steam ablation and Microwave therapy. There are many similarities between these treatments.

The saphenous veins are heated intraluminally, which lead to irreversible destruction of the vein wall. The difference is mainly in how this temperature increase is achieved and in the materials and catheters and the mechanism of action. Usually 1470 nm Diode laser is used with an average Linear Endovenous Energy Density (LEED) of 50-75 J/cm length is administered to the vein wall. Now even higher wavelength is being used but still investigational. The energy used is also related to the diameter of the vein. Higher energy is used to ablate larger veins. Usually Diode lasers are used for EVLA. The laser fiber is placed in the lumen of the veins and the laser energy is absorbed by blood, water and Proteins. RFA works by thermal destruction of veins by electrical energy which is converted to heat energy and that destroys tissue. Endovenous thermal ablation can also be done by Steam ablation and Microwave treatment. The technique is like EVLA and RFA. The inner vein wall is heated using an endovenous catheter. The steam is delivered to the vein by a canula and the steam is condensed and then cooled down to provide energy of 60 Joules of energy. Similarly heat ablation can be done by microwave ablation by generating the radiofrequency energy.

Endovenous thermal ablation requires a tumescant anesthesia where by a solution containing normal saline, Xylocaine, adrenaline and bicarbonates is instilled around the vein under USG guidance. Adrenaline causes vasoconstriction thereby reducing the lumen of vein and it also prevents the hematoma formation. Further adrenaline reduces the amount of local anaesthesia to be given. Bicarbonates help in changing the pH so that injection relatively becomes painless.

Endovenous procedures can be used as a day care surgery and they are safe with less complication rates and better cosmetic results. The possible side-effects are rare and include: Thrombophlebitis (7%), hyperpigmentation (5%), paresthesia (1-2%), hematoma (0-7%), postoperative pain and skin burns. Rarely major complications as DVT in 0.2% cases are observed. DVT in this scenario is a type of Endovenous Heat Induced Thrombosis (EHIT) and this may occur in 0.3% and 7.8% of patients. This is a point of controversy whether all patients with endovenous ablation should receive prophylactic anticoagulants but if there is thrombosis extending to femoral vein

then it is better to start the patient on anticoagulants. Even pulmonary embolism has been reported in a small number of cases after endovenous procedures. When delivering the energy by any means one has to remain at least 1-2 cm away from Sapheno-femoral junction to avoid the EHIT.

Sclerotherapy has been advocated for a long time for treatment of varicose veins of non trunkal veins and reticular veins but recently with the addition of foam sclerotherapy under ultrasound guidance it can be used for trunkal veins. The commonly used sclerosants are Sodium Tetradecyl Sulphate (STS) and Polidocanol. As sclerotherapy is associated with a high recurrence rate, NICE guidelines recommend their use as second line treatment [1].

To avoid the problems of heat, non-thermal techniques came in vogue. The new mechanochemical device (Clarivein®) (MOCA) being a hybrid procedure combining damaging the endothelium by mechanical device along with sclerotherapy is a useful non thermal technique. It minimizes the avoidance of the need of tumescent injections. Another potential benefit of this system is that the potential risk of nerve damage and surrounding tissue damage is minimized as thermal energy is not used and only mechanical damage of endothelium with destruction by sclerosants is used. MOCA technique is associated with 96.7% success using Sodium Tetradecyl Sulphate (STS). Even long term success has been obtained for GSV incompetence with success rate at 6 months was 94.7% and 94.1% at one year. For SSV ablation an occlusion rate of 94% was obtained.

Like MOCA, cyanoacrylate glue ablation is a non-thermal non-tumescent technique, and therefore does not cause the typical complications associated with thermal ablation techniques, such as burns or nerve injury. Also, since it does not require tumescent anesthesia, it is more comfortable and therefore potentially more useful for office-based application.

The quest for the optimal minimally invasive varicose vein treatment continues, and several treatment options are now available. Studies comparing the different options are available in the literature, but none, in the longer-term, reveals superiority of one technique over another, including open surgery. Consequently, there is no technique of varicose vein treatment that is better, but in practice different patients will benefit differently from different techniques. It is the practitioner's role to include all these techniques in his therapeutic armamentarium and use them accordingly, choosing either one or another depending on the patient [2].

Venous Leg Ulceration (VLU) is one of the worst complications of varicose veins as these ulcers fail to respond to conventional

treatment and they change the quality of life of the patient both morally and physically. The venous ulcer have been treated by some form of compression stocking and bandaging of both elastic and inelastic either in form of Unna foot, two layer compression or four layer compression with a healing rate of about 70% but the problem is that these patients even after healing of the ulcer come back with recurrence of ulcer in about 25% cases by one year. Effect of Surgery and Compression on Healing and Recurrence (ESCHAR) trial showed that the recurrence rate can be reduced if superficial reflux surgery can be added it reduces the recurrence rate [3]. In the recent year Early Venous Reflux Ablation (EVRA) trial is called as Game changer for the treatment of Venous Ulcer [4].

The treatment of varicose veins in the recent years has seen many changes in treatment with a better outcome in the adequate situation. A thermal technique has shown their promise as standard of care. But with the complications associated with thermal energy and the tumescent anaesthesia, the era of the non-thermal-non-tumescent technique are seeing the light of the day though it is too early to say that they will match the results of thermal techniques but whatever the short outcomes are available they show that they are equivalent to thermal techniques [5].

Though there are many newer modalities for treatment of varicose veins but still we are in the search of Holy Grail, a procedure which is associated with 100% recurrence free and without any side effect and complication

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