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Treatment of superficial venous incompetence

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ABSTRACT

Superficial venous incompetence is a common lower limb vascular condition, with venous ulceration representing the most severe sequela of the disease. The treatment of superficial venous incompetence can aid in ulcer healing, and a variety of modalities are available. Successful treatment requires attention to appropriate patient selection and procedural technique.

1. Introduction

The Society for Vascular Surgery and the American Venous Forum published evidence-based recommendations for the care of patients with chronic venous insufficiency [1]. In relation to endovenous thermal ablation and sclerotherapy, the practice guidelines reaffirm the safety and efficacy of both laser ablation and radiofrequency ablation for the treatment of truncal reflux. In addition, both methods are recommended preferentially to open surgery due to reduced convalescence time and decreased incidence of post-procedural pain and morbidity. In addition, the guidelines state that liquid or foam sclerotherapy is recommended for the treatment of telangiectasias, reticular veins, and varicose veins. Other ablation technologies have been developed that are still accruing data, including steam vein sclerosis, mechanochemical ablation, and cyanoacrylate-based ablation. The advantages attributed to these technologies are that they do not require the use of tumescent anesthesia. Although the safety and efficacy of the tumescentless technologies are still being vetted, it is in the interest of clinicians involved in the care of patients with superficial venous incompetence to be aware of these new treatment modalities, as the treatment landscape is constantly evolving.

2. Open surgery for superficial venous incompetence

The objective of open varicose vein surgery is to ligate and disconnect the great saphenous vein (GSV) or small saphenous vein (SSV) and branches at the junction with the deep venous system, thereby eliminating the source(s) of truncal reflux. In parts of the world, open varicose vein surgery remains the standard for treatment of chronic venous insufficiency. High ligation and stripping of the GSV is less costly, but still effective compared to endothermal ablation techniques, at least in the short term [2]. Treatment failure after high ligation (HL) and stripping are thought to arise, at least in part, secondary to ligation of the junctional tributaries, resulting in neovascularization and contributing to varicose vein recurrence.

Consequently, there is some evidence that performing saphenectomy without HL, while sparing the junctional tributaries, diminishes the risk of recurrence [3]. Although conventional varicose vein surgery starts with complete dissection of the saphenofemoral junction (SFJ) with concomitant ligation of the junctional tributaries, newer surgical methods aim to minimize surgical trauma to the SFJ. These alternative methods advise performing saphenectomy by making a small incision below the knee to access the GSV

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and limit injury at the SFJ, which has being associated with neovascularization and recurrence of varicose veins as a result of dissection, division, and ligation.

Casoni et al [3] proposed that GSV surgery without HL of the SFJ is associated with low rates of clinical and ultrasound-determined recurrence of varicose veins after a mean follow-up of 8 years. They compared two groups in a prospective randomized trial; one group was subject to HL of the SFJ, foramen ovaloplasty, and an infolding suture to hide the free endothelium of the saphenous stump, and the other group underwent saphenectomy without HL of the SFJ. The group that underwent HL had a combined clinical and ultrasound-determined recurrence rate of 32.2% as compared to the group without HL, which had a 16.4% recurrence rate ($P = .045$). In another retrospective study, preservation of the SFJ during GSV saphenectomy using a limited inguinal approach was associated with favorable results in hemodynamic efficacy and SFJ neovascularization at 2-year follow-up, with a clinical recurrence rate of 6.3% [4].

2.1. Technique, discharge, and follow-up

Although traditionally performed under general anesthesia, saphenectomy can be performed using a femoral nerve block, supplemented with tumescent anesthesia [5], which helps with hydrostatic dissection of the vein and provides for hemostasis in the saphenous tunnel after stripping.

One technique for open saphenectomy identifies the GSV in the upper posteromedial calf through a small incision. After identification of the GSV in the leg, a semi-rigid stripper is inserted and advanced centrally. Using palpation of the stripper for guidance, the GSV is exposed in the thigh with a Muller hook through a small incision approximately 2 to 3 cm peripheral to the SFJ. It is then ligated distal to the epigastric and peroneal veins to preserve physiologic drainage. An infolding suture is performed at the SFJ stump to prevent exposure of the endothelium and to reduce the risk for neovascularization. After suture ligation, there is no further surgical dissection or division of junctional tributaries [4], and the process is completed by stripping of the GSV by invagination [6].

Stripping of the SSV can be achieved similarly through a small transverse incision at the popliteal crease with limited invagination stripping of the vein to the midcalf. To aid in the identification of the SSV, intraprocedural duplex scanning should be used. To avoid sural nerve injury, ligation of the SSV should be performed at the level of the popliteal crease and 3 to 5 cm peripheral to the saphenopopliteal junction (SPJ). This avoids the need for deep dissection of the popliteal fossa and the associated wound and neurovascular complications.

After application of a sterile dressing, a short, stretch elastic wrap is placed up to the level of the thigh. This is recommended for 24 hours, then the patient is advised to wear a 30 to 40 mm Hg elastic stocking for a period of at least 1 week to decrease edema and to mitigate postoperative discomfort. Anti-inflammatory medication is recommended for at least 10 days postoperatively. Patients are permitted to immediately resume activities of daily living. Showering is acceptable with proper water-resistant leg coverage. An example of a follow-up regimen would consist of duplex ultrasound examination at 1 week post procedure with repeat follow-up appointments at 3 months, 1 year, and annually thereafter.

2.2. Complications

The complications of open saphenous surgery are often minor and self-limited, as a better understanding of venous hemodynamics has changed and the technique of GSV stripping has evolved from long-segment treatment from the ankle to the groin to a limited groin to knee stripping [7,8]. The primary complications consist of pain, bruising, and recurrence. Less common complications include, but are not limited to, nerve injury resulting in paresthesias, neovascularization, pigmentation, infection, arteriovenous fistula formation, deep venous thrombosis, and pulmonary embolus.

3. Sclerotherapy for superficial venous incompetence

Sclerotherapy has been used for the treatment of varicose veins for close to 100 years [9]. Injection sclerotherapy attempts to treat varicose veins by means of disruption of the vein endothelium, leading to vasospasm, occlusion, and subsequent fibrosis of the vein. Sclerotherapy is a chemical method for venous ablation, and it can treat a large range of vein sizes from telangiectasias to axial reflux in the GSV. In general, liquid sclerotherapy is used to treat veins of smaller diameter, typically <3 mm. Due to the increased active surface area provided by foam bubbles, foam sclerotherapy is preferred for the treatment of pathologic veins of a larger diameter. This allows for increased exposure of the sclerosant to the vein wall endothelium. Traditionally, the method to create foam from a liquid sclerosant is called the Tessari method, and uses a double-syringe method, which mixes gas and liquid using a three-way stopcock [10]. Although the Tessari method is effective for the preparation of foam from a liquid sclerosant, it is affected by the type of gas used and the diameter of the hole inside the three-way stopcock, which results ultimately in different densities and bubble sizes [11]. Although injection sclerotherapy has assumed a major role in the treatment of smaller veins, such as reticular veins and telangiectasias, it can also be used for the treatment of truncal reflux (ie, GSV or SSV reflux).

The use of ultrasound-guided foam sclerotherapy for the treatment of truncal reflux does not require the use of tumescent anesthesia because it is not an endothermal technology. It has been demonstrated to be a safe and effective treatment modality [12].

As a corollary to the Tessari method, the US Food and Drug Administration recently approved Varithena (BTG International Inc., West Conshohocken, PA) as a chemical ablation modality for the treatment of incompetent GSVs, accessory saphenous veins, and visible varicosities of the GSV system above and below the knee. Varithena does not yet have an approved indication for the treatment of refluxing SSVs. This endovenous microfoam sclerosant consists of a proprietary mixture of an aqueous 1% polidocanol solution and a gas