Candidacy for Endovenous Ablation

What makes a patient a good candidate or a noncandidate, how we know, and whether that has changed in the past 5 years.

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Patient selection for endovenous ablation is multifaceted, requiring an understanding of the patient's primary complaints while identifying the source of venous reflux. Many patients may not attribute symptoms to venous disease, due to the insidious onset and thus are surprised to realize the improvement in quality of life after treatment. Symptoms of venous disease include pain or tenderness, leg heaviness, pruritus, burning, night cramps, edema, skin changes, and paresthesias. Symptoms may intensify during menstrual cycles, pregnancy, and with exogenous hormone therapy. The pain associated with venous disease typically improves with ambulation or with elevation. Conversely, the pain of arterial occlusive disease is provoked with ambulation and elevation.

The main objective of varicose vein treatment is the elimination of reflux pathways followed by obliteration of the venous reservoir (varicosities) (Figure 1). Usually, patients who are candidates for saphenous vein stripping are also eligible for endovenous ablation. Endovenous ablation therapy is most often used to treat incompetent truncal veins, namely, the great saphenous, small saphenous, and anterior accessory saphenous veins and, rarely, thigh circumflex veins. Endovenous ablation techniques involve either thermal or chemical destruction of venous tissue. Alternatively, extirpation of abnormal venous tissue is sometimes necessary.

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Successful treatment of chronic venous disease usually involves the elimination of superficial venous reflux together with an understanding of the status of the perforating and deep venous systems.[1,2] Contrary to conventional wisdom, previous deep vein thrombosis is not a contraindication to endovenous saphenous truncal ablation. The profunda femoris vein, as well as many unnamed deep venous collaterals, provide adequate drainage in the setting of chronic femoral vein obstruction.[3] Obviously, acute deep vein thrombosis is an absolute contraindication. Thrombophilias must be addressed, and supportive prophylactic anticoagulation should be individualized based on the nuances of each patient.

Accurate duplex imaging provides crucial information for proper diagnosis and subsequent treatment. Variants in saphenous vein morphology may pose challenges to selecting the correct treatment modality. Incompetent saphenous truncal veins may be straight or tortuous, superficial or deep, large or small.

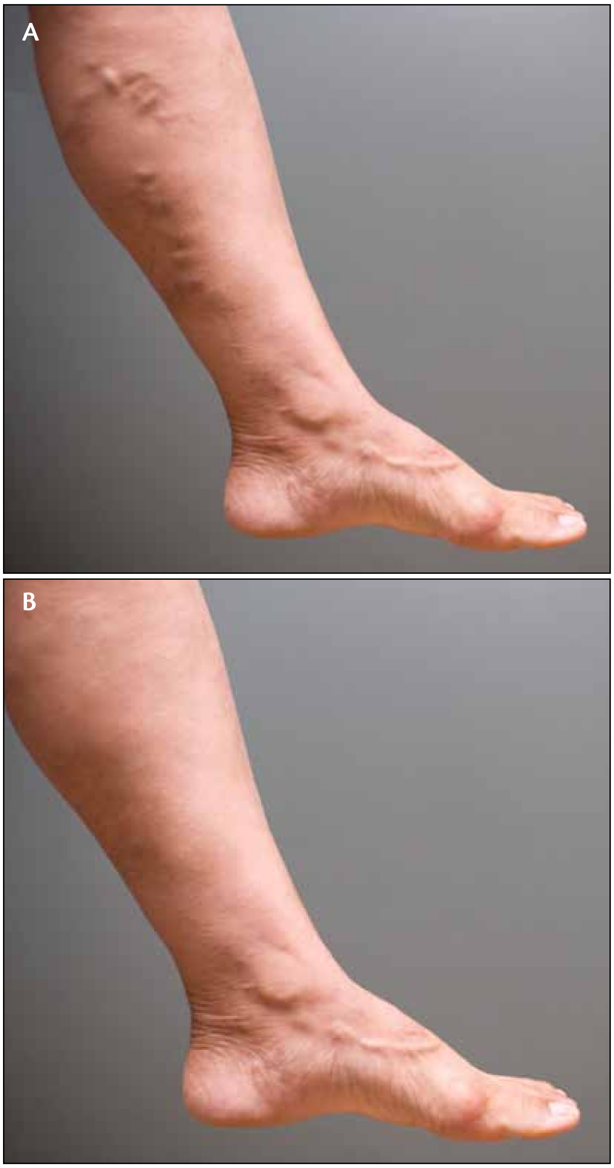

Figure 1. Before (A) and after (B) images of endovenous ablation and phlebectomy.

AVAILABLE TECHNOLOGY

Endovenous Laser Ablation

The fibers of endovenous lasers may cause venous perforation with direct contact, causing perivenous inflammation, pain, and ecchymosis. Researchers have studied alternative wavelengths and altered the fiber tips to mitigate these events. Historically, endovenous laser ablation (EVL) acts through hemoglobin-mediated absorption (810, 940, and 980 nm), generating endovenous steam bubbles and resulting in damage to the vein intima and thrombotic occlusion of the treated vein. The 1,470-nm wavelength is a water-specific wavelength (40 times higher affinity for water than the 980-nm wavelength) and thus more readily targets the vein wall.[4]

Lower energy densities are required with the 1,470-nm wavelength to accomplish equal effects, thus minimizing vein wall perforations. A sliding scale energy protocol (larger diameter requires more energy) with aggressive venous diameter diminution through tumescent anesthesia allows the greatest opportunity for long-term closure with all available wavelengths.[5] Advances in endovenous laser technology seek to develop near-infrared wavelengths of 2,000 nm, targeting the final peak of water absorption. Theoretically, bypassing hemoglobin absorption should increase absorption of laser photons by interstitial water and myoglobin in the vein wall.

Radiofrequency Ablation

The second-generation radiofrequency ablation (RFA) catheter with a 7-cm-long heating element was developed to increase efficacy and procedure speed through the concept of segmental ablation at a higher temperature. These second-generation RFA devices became available in 2007 and markedly improved saphenous closure rates while maintaining a smooth postoperative recovery. The newest RFA catheter became available this year; it has a 3-cm-long heating element, allowing treatment of shorter vein lengths.

Chemical Ablation

Chemical ablation, most commonly known as *ultrasound-guided foam sclerotherapy* (UGFS), can take many forms. The most commonly used sclerosants, sotradecol sulfate and polidocanol, are fatty acid detergents that can be delivered in either an aqueous or foamed format. For purposes of truncal saphenous vein ablation, sclerosants can be delivered directly with a syringe needle or via a catheter, both of which require ultrasound guidance. The newest catheter delivery system uses dual injury, that is, mechanicochemical ablation (MOCA).

MOCA

The MOCA system works under the principle of dual injury. Using ultrasound guidance, the MOCA catheter is positioned near the saphenofemoral junction, and a rotating catheter tip induces mechanical agitation of the endothelium. The sclerosant is then infused during catheter pullback, resulting in venous occlusion. Unlike EVL or RFA, MOCA does not require placement of tumescent anesthesia. Short-term closure rates using MOCA are similar to those of RF or EVL for veins < 10 mm in diameter; however, long-term data have yet to be reported.

Cyanoacrylate Glue

Like the MOCA procedure, cyanoacrylate (CA) adhesive eliminates the need for tumescent anesthesia and costly generators. When introduced intravascularly, CA glue triggers an inflammatory response, causing polymerization and, ultimately, venous fibrosis. We recently reported a first-in-man clinical trial at the American Venous Forum on 38 patients.[6] All patients were treated with an average of 1.58 mL of CA adhesive. Two recanalizations were identified at 6 months of follow-up, and two minimal skin-related adverse events were observed.

ANATOMIC CONSIDERATIONS

Vein Tortuosity

Catheter-directed ablation (thermal or chemical) is best suited for straight, incompetent veins coursing within the saphenous canal. Vein tortuosity and/or adherence to the overlying skin are two anatomical variations that pose specific challenges for endovenous treatment.

Guidewires and endovenous catheters are solid objects and require a relatively straight conduit for delivery (ie, they are not easily navigated through tortuous veins). Chemical agents, on the other hand, are present in either liquid or gaseous forms and are easily navigated through tortuous veins if injected directly with a needle. Recurrent varicose veins often have associated tortuosity and are not readily suitable for catheter techniques; therefore, UGFS delivered via needle syringe is ideally suited for these cases. UGFS causes venous inflammation and can lead to staining when veins are located close to the skin surface. Therefore, veins that are easily palpated are best extirpated with microphlebectomy.

Superficial Accessory Saphenous Vein

Occasionally, a refluxing superficial accessory saphenous vein (SASV) may be encountered. The course of the SASV is parallel and superficial to the GSV as it exits the saphenous canal into the subcutaneous space. Often, the SASV originates at the mid-thigh and is adherent to the dermis, which can potentially burn the overlying skin with thermal ablation. Endovenous (thermal or chemical) treatment of the SASV may also result in a palpable cord and a stain to the medial thigh and leg. Even though stain resolution is spontaneous, the unsatisfactory cosmetic result may persist for a year or more.

A hybrid technique, laser-assisted distal saphenectomy, is ideal for the aforementioned case scenario. Laser-assisted distal saphenectomy involves lasering the proximal GSV and removing the distal "dermal SASV" through invagination stripping under tumescent anesthesia.[7] The end of the sheath is sutured to the SASV and then stripped from mid-thigh to upper calf, applying traction from below.

Recurrent Varicose Veins

Patients with a history of high ligation and stripping usually present with recurrent varicose veins secondary to neovascularization at the groin. Often, we will use a combination of endovenous laser to treat saphenous remnants, ultrasound-guided sclerotherapy for neovascularization, and phlebectomy for removal of varicose veins palpable on the skin.

CONCLUSION

Straight, incompetent veins may be burned, tortuous veins foamed, and palpable skin veins removed with phlebectomy. Advances in minimally invasive endovenous technology (new laser wavelengths, new-generation RF catheters, tumescentless MOCA, and CA adhesive procedures) foster an increase in long-term closure rates and, ultimately, patient satisfaction. However, without a thorough history, complete and accurate duplex imaging, and the proper treatment modality, technology is rendered ineffective. ■

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