

# New Technologies for the Treatment of Varicose Veins and Venous Reflux

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## Ablation of Saphenous Reflux

The Closure procedure (VNUS Medical Technologies, Inc., San Jose, CA) is a novel endovascular computer-feedback controlled application of bipolar electrothermal energy that ensures transmural heating of the treated vein wall while minimizing thermal spread to neighboring tissues.<sup>1</sup> This is a catheter-based procedure in which the saphenous vein is ablated from within by resistive heating.<sup>1</sup> Bipolar delivery of RF energy directly to the vein wall causes resistive heating that results in total loss of vessel wall architecture, disintegration, and carbonization.<sup>2,3</sup> The device provides continuous impedance and vein wall temperature feedback to a computer generator that allows the operator to vary catheter pull-back speed to ensure effective radiofrequency ablation of the vein.<sup>1</sup> Numerous studies have demonstrated that the Closure procedure is an effective surrogate for surgical stripping.

The endovenous laser is also approved by the US Food and Drug Administration for the treatment of GSV reflux<sup>4-6</sup>; 810 nm wavelength laser energy is delivered via a 600 mm fiber. The laser causes the blood to boil which results in steam bubbles.<sup>6</sup> This causes collagen contraction and endothelial damage. The result is thickening of the vein wall and contraction or thrombosis of the lumen. EVLT appears to be a viable option in the treatment of saphenous vein reflux. The modality is safe with acceptable mid-term results. ELVT has the advantage of less expensive disposable items, therefore with a lower cost procedure.

## Resection of Varicose Veins

The technique of stab avulsion phlebectomy was introduced by Dr. Robert Muller in 1966.<sup>7</sup> The original procedure, that was modified by use of sterile technique, is widely practiced and should be considered the "gold standard" for removal of varicose veins.<sup>8</sup>

The Trivex System (Smith & Nephew Andover, MA) utilizes a light source beneath the skin for varicose vein visualization and a powered suction resector to perform the phlebectomy.<sup>9-12</sup> The concept of TIPP is to improve excision accuracy with direct visualization of the varicose veins and to decrease operative time with the specialized resector. The procedure is performed with two devices. The transilluminator consists of a light from a 45° illuminator connected to a 300 W light source. There is a port on the transilluminator for the instillation of tumescent anesthesia. The resector is a rotating blade protected by an outer sheath with suction attached to it. The blade rotates at various speeds in a forward, reverse or oscillating manner. The varicosities are aspirated, morcellated and then removed by suction. The procedure is operator-dependent and there is a definite learning curve necessary to achieve good results.

## Foam Sclerotherapy

Orbach introduced the concept of sclerotherapy utilizing an intravenous air block a half-century ago.<sup>13</sup> Utilizing foam sclerotherapy the dilution of the sclerosant with blood in larger veins is reduced. An air block is formed which halts blood flow in the vein. The surface area of the sclerosant is larger and therefore the agents are more effective. Foam sclerotherapy is gaining acceptance in Europe and several new sclerosing agents are being developed. At the present time there are no foam sclerosants commercially available in the United States. However, foam sclerotherapy can be performed by mixing currently approved sclerotherapy agents with air to create microfoam.

Patients must have no contraindications to sclerotherapy. Ultrasound guidance is utilized to identify the saphenous vein or perforating veins. Local anesthesia in the skin at the site of injection can be used to decrease pain while the foamed sclerosant is injected into the vein. External compression at the saphenofemoral junction can prevent entry of the agent into the deep venous system. Compression dressings are then placed. The procedure is associated with very little discomfort and can be performed on an ambulatory basis. Minor complications of the procedure are reported to be pigmentation and superficial thrombophlebitis. However, more serious complications can include anaphylaxis and intraarterial injection.<sup>13-16</sup>

Cabrera and colleagues demonstrated that foam sclerotherapy was effective in treating varicose veins with saphenous reflux in 86% of patients.<sup>14</sup> Single treatment of foam sclerotherapy utilizing ultrasound guidance was effective in obliterating the greater saphenous vein in 81% of cases. This treatment was effective in eliminating varicose veins in 96% of cases. Re-treatment was necessary in only a few cases. Other authors have also demonstrated excellent long-term results in the treatment of greater and lesser saphenous vein reflux using this technique. In one study, elimination of reflux was noted in virtually all patients at 3-, 6-, and 12-month follow-up.<sup>15</sup>

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## NOTES