

## Principles of Ambulatory Phlebectomy

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Ambulatory phlebectomy (AP) is a surgical procedure designed to allow outpatient removal of bulging varicose veins. This treatment originally was described and performed by Aulus Cornelius Celsus (56 BC–30 AD) in ancient Rome.<sup>1</sup> However, the art of AP was revived, redefined, and practiced by the sagacious Swiss dermatologist Robert Muller in 1956. Prior to Muller's reintroduction of AP, veins were removed with relatively large incisions and ligation of venous ends. Muller developed the stab avulsion method that is now in widespread use. Characteristics of Muller's AP technique are absence of venous ligatures, exclusive use of local infiltration anesthesia, immediate ambulation after surgery, 2-mm incisions, absence of skin sutures, and a postoperative compression bandage kept in place for two days, then replaced with daytime compression stockings for three weeks.

It is of interest that after its introduction, the medical-scientific community exhibited minimal interest in Muller's AP procedure. Muller published his first manuscript on AP in 1966;<sup>2</sup> however, AP did not gain popularity in the United States until the American surgeon Gabriel Goren published his findings in 1991.<sup>3</sup> In contemporary vein centers, AP is a common office-based procedure performed with local anesthesia. Unless the patient's history suggests other comorbidities, hematologic or other laboratory investigations are not generally required.

### INDICATIONS

AP is indicated for the removal of varicose venous tributaries, when visible, and palpable on the surface of the skin. AP is simple to perform, well tolerated, and can be used in conjunction with other treatment modalities. The most

important concept for the practitioner treating varicose veins to understand is that simple vein removal, without proper diagnostic evaluation, will not yield good results. It is critical to recognize that bulging veins usually are associated with an underlying source of venous hypertension, and treatment of the source is as important as the vein removal itself. Prior to performing AP the treating physician must perform a thorough evaluation with duplex ultrasound imaging to identify the source of venous hypertension and its most proximal point of reflux. To prevent recurrence, the refluxing source in continuity with the varicose veins should be eliminated prior to undergoing AP.

The most common source of ambulatory venous hypertension is an incompetent superficial system, usually the Great Saphenous vein (GSV). An incompetent GSV, in continuity with a bulging venous tributary, commonly is encountered in patients presenting with venous disease. However, venous hypertension also may originate from deep veins, perforating veins, or any combination of superficial, perforating, and deep systems. If a source of ambulatory venous hypertension is identified during the preoperative studies, it should be treated either prior to or at the same time as AP. There are many techniques available to treat axial or perforator vein incompetence that are beyond the scope of this essay. Briefly, superficial axial vein reflux may be corrected by surgical, thermal, or chemical means.

### PREOPERATIVE MAPPING

Mapping is done prior to commencing AP and is a critical step in the procedure. It must be comprehensive. The key to success is accurate marking of the surface bulges with an indelible marker in the standing position (see Figure 27.1).



FIGURE 27.1 Mapping.

Marking is performed in the standing position because hydrostatic pressure is no longer active when the patient is supine. Stated differently, bulging veins disappear when patients lie flat because the local venous pressure decreases to near zero mmHg. We prefer mapping these veins using visual inspection and palpation; other investigators prefer transillumination mapping.<sup>4</sup> Precise mapping provides a blueprint for the operator to locate veins with ease, careless mapping provides a poor blueprint and results in suboptimal surgical results. Patients should avoid placing moisturizing lotions on their legs the morning before surgery as this promotes smudging during the preoperative surgical scrubbing process, thereby undermining the quality of the blueprint.

### ANESTHESIA

Tumescent anesthesia provides a safe, easy to administer, and comfortable anesthetic technique for use with ambulatory phlebectomy. The technique of tumescent anesthesia involves infiltration of the subcutaneous compartment with relatively large volumes of a dilute mixture of a buffered local anesthetic solution. Preparation of the tumescent solution is easily accomplished. Our preparation requires a 50 cc

vial of 1% lidocaine with added 1 : 100,000 mg of epinephrine mixed with 500 cc of Ringers Lactate. This gives a 0.1% preparation of lidocaine with epinephrine, which is delivered with a 30 cc syringe and 20-gauge needle subdermally, under pressure, until the characteristic peau-de-orange effect is seen on the skin.

This form of anesthesia requires no specialized training or expensive equipment and offers several intraoperative as well as postoperative advantages not found in traditional local anesthesia. Not only is excellent anesthesia provided to relatively large areas of the leg, but the tumescent fluid hydrodissects the subcutaneous fat. It enters perivenous tissues under pressure, thus facilitating vein extraction. This has led to use of this technique not only in AP, but also in surgical stripping<sup>5</sup> and thermal ablation of the Great Saphenous vein.

Originally developed by Klein<sup>6</sup> in 1987 for use in liposuction, Cohn<sup>7</sup> in 1995 introduced the technique of tumescent anesthesia for use in ambulatory phlebectomy. Surprisingly, as the concentration of lidocaine was lowered during the developmental stages of the technique, it was observed that the anesthetic effect was augmented until a threshold 0.04% was reached. Klein has shown through clinical studies involving assays of lidocaine in peripheral blood, that doses well above the manufacturer's recommendation are safe. The widely held dogma that lidocaine administration should be limited to 7 mg/kg was based on extrapolated data from procainamide levels. This dogma was rigidly adhered to from 1948 because of recommendations from the manufacturer. It is now known through Klein's work that a dose of 35 mg/kg of dilute lidocaine solution is well tolerated.<sup>8</sup> Further documentation and years of safe use have made it the standard for anesthesia in liposuction surgery. However, the authors have found that exceeding 7 mg/kg is rarely necessary to complete a unilateral lower extremity endovenous thermal ablation with concomitant AP.

Infiltrating solutions should contain epinephrine in appropriate concentrations to reduce the incidence of hematoma and induce a more gradual absorption of lidocaine into the bloodstream. When general anesthesia is used for this surgery (i.e., dry technique), there is no infiltration of local anesthetic or vasoconstrictor agents. This results in blood loss and significant pain. Other advantages of tumescent anesthesia include the ability to anesthetize large areas of the body without toxicity, positive effect on intravascular fluid status, avoidance of general anesthesia, less pain, and shorter postoperative recovery time.<sup>8</sup>

Infections are rare after liposuction and AP with tumescent anesthesia, and usually are confined to an incision site.<sup>9</sup> Infections have not been seen in our practice since we began office-based AP surgery with tumescent anesthesia. The reason for the low rate of infection is not clear, although there are reports of lidocaine concentration-dependent

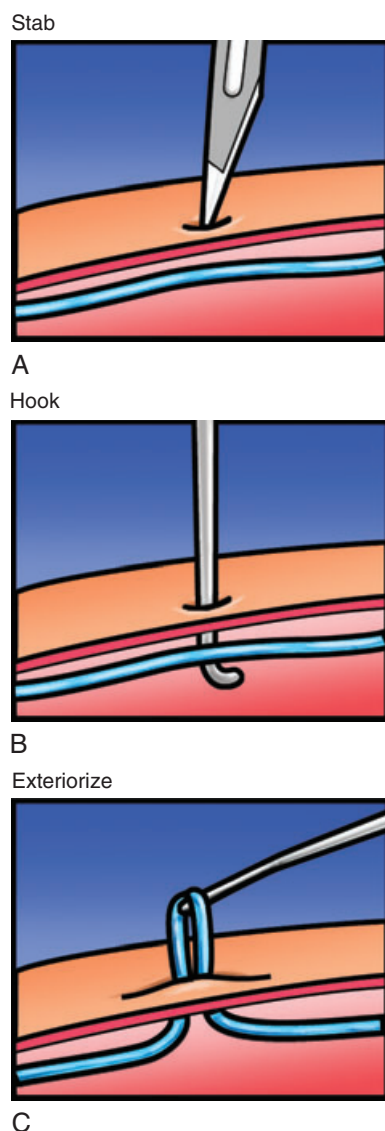


FIGURE 27.2 Stab incisions.

bacteriostatic and bactericidal activity. Pathogens commonly found on the skin may be sensitive to this activity.<sup>10</sup>

## SURGICAL TECHNIQUE

### Incisions

Access to varicose veins is accomplished with a sharp instrument using small stab incisions (see Figure 27.2). Incisions of 1–3 mm in length are usually sufficient to extirpate even the largest veins. The methods and required tools are simple and basic. The most popular instruments for creating incisions are No. 11 scalpel blades, 18 gauge needles, and 15 degree ophthalmologic Beaver blades. Incision length

should correspond to vein size, but are rarely larger than 3 mm. Small varicose veins are extracted through an 18 gauge needle puncture, and larger veins are removed through 2 mm incisions made with an No. 11 scalpel blade. The incisions are oriented vertically on most areas of the lower extremity. Horizontal incisions are preferred around the knees and ankles.

Widening of incisions with a hemostat should be avoided because this results in an increased potential for unsightly scars and/or wound infections. If wound margins are traumatized this may lead to increased pigmentation in the postoperative scar. There have been anecdotal reports of “tattooing” the skin when the incision is placed through the indelible ink mark made during the preoperative mapping process. This has not been the experience of the authors.

Reimbursement for AP has been established with Current Procedural Terminology (CPT) codes. Insurance carriers base the remuneration for services on the number of stab incisions; therefore, it is important to count the total number of incisions made during each case and document this information in the clinical record.

### Hooking and Extraction of Vein

Hooking the target vein through the small incision is the next step (see Figure 27.2). There are many instruments available on the market to accomplish this goal, ranging from inexpensive to very expensive. Most operators use hooks to elevate the vein from the wound whereas others reach into the wound and grasp the vein with fine hemostats. The most popular hooks are medical grade with the developer’s name used for identification (i.e., Muller, Oesch, Tretbar, Ramelet, Verady, and Dortu-Mortimbeau). However, we prefer hooks manufactured for crochet; they are readily available, come in a variety of sizes, and are suitable for autoclave sterilization between uses.

Using a hook of choice, the vein is exteriorized from the wound (see Figure 27.2). Hooks need not be introduced into the wound deeper than 2–3 mm and should be inserted gently and deliberately to avoid unnecessary trauma to the wound margins. Gentle probing and “searching” for the target vein with the hook is routinely necessary and should be done with great care. Once a segment of vein is exteriorized from the wound it is extracted. The vein is grasped with fine hemostatic clamps, and using gentle traction in a circular motion the vein is teased out of the wound. Dissection of the vein from its perivenous investments greatly facilitates its extraction. Perivenous tissue issuing from the wound is excised at the skin level. This tissue should never be forcefully pulled out of the wound. Care should be taken during extraction not to enlarge the wound, especially in the elderly.

When traction is applied to the vein, the skin adjacent to the wound will momentarily depress downward. Attention to this detail gives the operator an idea of where to place the



**FIGURE 27.3** Vein of Michaelangelo extracted via one 2-mm incision.

next incision. The depression represents the point at which the vein will avulse. The next incision is made near the area of depressed skin and the process is repeated sequentially until all the venous bulges have been addressed. Although all bulges should be marked during the mapping procedure, not all the marks need to be incised if the operator takes care in identifying the skin depressions described earlier. In some cases, segments as large as 12 inches may be removed from a single site (see Figure 27.3). Segmental extraction of very small portions of varicose veins can make the operation quite tedious; in some cases this cannot be avoided.

If vein exteriorization proves difficult, it is better to make larger incisions rather than traumatize the wound's edges since this may cause visible scars. In order to reduce the number of incisions, the incisions are made one at a time. If avulsion proves difficult and the vein breaks, it is more convenient to make more incisions than to increase effort and in return lose time.<sup>11</sup> One should also keep in mind that the skin in elderly patients is thin and easily damaged if not handled properly. This is especially true in the ankle, foot, and popliteal areas.<sup>12</sup>

Several areas of the lower extremity are more challenging when attempting to hook a vein. Areas of previous surgery and the anterior aspect of the knee have thick skin and fibrous underlying tissue, which can make the hooking process difficult. There is a paucity of subcutaneous fat in the pretibial areas and dorsum of the foot that can also prove challenging. With experience one learns to distinguish between the vein wall, which is elastic, and the connective perivenous tissue, which is not. Ultrasound guided vein hooking is useful for deeper or more difficult veins. AP is not the best technique for removal of the GSV or SSV; we prefer endovenous thermal ablation for these veins.

Avulsion of venous segments treated by AP is not associated with significant bleeding when tumescent anesthesia is used. Hemostasis is achieved with gentle pressure over the incision site. The epinephrine in the anesthetic solution, enhances the hemostasis process. When extracting larger veins with the stab-avulsion technique, significant force may be required and some minor bleeding may be encountered. Using digital pressure over the wound with a gloved finger generally controls bleeding. Placing the patient in the Trendelenberg position may also augment hemostasis.

Varicose veins are sometimes outflow tracts for perforating veins; therefore, avulsion of varicose veins can disconnect underlying perforators. A perforator may be recognized by its perpendicular course and by the fact that the patient reports discomfort or pain upon traction of the perforator. The perforator is pulled until it yields, and then avulsed. Bleeding is controlled with digital compression. However, in areas difficult to compress (i.e., thigh) or when perforators are very large, ligation is preferred.<sup>11</sup>

### Incision Closure

The wounds may be left open, or closed with simple sutures or adhesive tape. Whether to close or not close wounds is a matter of judgment. Most operators leave the wounds open and allow spontaneous healing. This technique results in little or no scarring and also has the advantage of allowing drainage of blood and anesthetic fluid into the overlying compressive dressing. A single suture to close wounds near the foot and ankle may be required because of the elevated venous pressure in the upright position in these locations. Frequent post-procedural ambulation will aid in decreasing ambulatory venous pressure in these dependent locations. Adhesive tapes are associated with a high incidence of skin blistering; therefore, these must be used with caution.

### Compression Bandage

Careful application of the postoperative dressing cannot be overstated. Careless dressing placement can lead to hematomas, blisters, nerve injury, ischemia, and bleeding. The limb is wrapped circumferentially from foot to groin with a compression dressing and removed after 48 hours. The dressing should be applied with graduated pressure; the amount of pressure should decrease as one proceeds from foot to groin. During placement of the compressive bandage, it is important to pad the lateral fibular head to avoid pressure induced injury to the deep and superficial peroneal nerves which can lead to foot drop. Patients are encouraged to ambulate immediately after the procedure to minimize thromboembolic complications.

Application of a compressive dressing in obese patients is especially critical because the dressing has a tendency to

unravel. There is a tendency to apply this dressing tightly, but this can lead to undue pressure, blistering, and/or skin necrosis.

### POST-PROCEDURE ISSUES

The patients ambulate from the office with a three-layer compression bandage after 10 minutes of post-operative observation. Very little post-operative discomfort is the norm, and is usually easily managed with nonsteroidal anti-inflammatory agents. When the bandage is removed in the office on post-operative day 2, some minor leakage of blood and tumescent anesthesia may be seen in cases where the wounds are left open. These areas are covered with small bandages until dry. We perform a duplex ultrasound at the post-operative visit to exclude the presence of deep vein thrombosis.

Some ecchymosis is to be expected, rarely resulting in permanent discoloration of the skin. Indurated areas are commonly seen and usually decompress without incident over a period of weeks. Firm subcutaneous inflammatory nodules can form directly under the incision, and these, too, are self-limiting. We give the patient three days of postoperative antibiotic prophylactic therapy. After the compression bandage is removed on post-operative day 2, we have the patients wear graduated compression stockings (20–30 mmHg) for two weeks during the daytime.

### COMPLICATIONS

Complications from AP in experienced hands are rare, and when they do occur, are minor.<sup>12</sup> The Miami Vein Center to date has performed more than 1500 AP procedures in the office environment. Complications have been limited to hyperpigmentation, telangiectatic matting, seroma, transient paresthesia, superficial phlebitis, blistering, and “missed veins” requiring repeat treatment. Each of these complications occurred in less than 0.5% of cases.

A multicenter study performed in France evaluated 36,000 phlebectomies. The most frequently encountered complications were telangiectasias (1.5%), blister formation (1%), phlebitis (0.05%), hyperpigmentation (0.03%), post-operative bleeding (0.03%), temporary nerve damage (0.05%), and permanent nerve damage (0.02%).<sup>13</sup>

### STAGING OF SURGERY

Prior to the advent of endovenous ablation, high ligation and stripping of the GSV usually relegated venous surgery to the operating room. However, with the development of

minimally invasive, catheter-based interventions, venous surgery is a simple office procedure.

Complete surgical removal of varicose veins may be achieved in a single session or in separate sessions. Endovenous ablation and AP are suitable for the office, and in the author’s practice, routinely are performed together. The advantage of this combination technique is that patients can expect all varicose veins to disappear after a one-hour procedure.

We feel that in order to become a complete vein surgeon, the individual must become facile with all of the available tools. The operator should enter the procedure room with a complete plan of action. The duplex ultrasound device must be an extension of the surgeon’s eyes. Duplex ultrasound is essential for managing the patient preoperatively, intraoperatively, and postoperatively. Combining endovenous thermal ablation, AP and sclerotherapy techniques with accurate imaging will allow the development of a complete treatment algorithm.

We do not look at AP as a solitary procedure, but as part of the armada in the treatment of venous disease. We usually perform endovenous thermal ablation of the saphenous trunk at the same setting as AP because bulging varicose veins are usually in continuity with a refluxing axial vein such as the GSV. Sclerotherapy is also often used simultaneously with AP when the refluxing axial vein is tortuous. This is often the case when the anterior accessory saphenous vein is incompetent or when we treat recurrent varicose veins after previous high ligation and stripping. We try to keep the sites of AP remote from the sites of sclerotherapy for fear of extravasation of sclerosant from fractured vein ends into the subcutaneous tissues. All procedures are guided with duplex ultrasound to get a “roadmap underneath the skin.”

Varicosities in continuity with a refluxing truncal vein (e.g., the GSV), and not in continuity with any perforating veins, will diminish in size after endovenous ablation. Therefore, some patients will not require further treatment. However, in review of our last 1000 cases of endovenous thermal ablation of the saphenous vein, AP was performed concomitantly in 86% of cases.

Some operators delay AP until four weeks following endovenous ablation. The argument for this strategy is to allow the bed of varicosities distal to a refluxing axial vein to shrink in size and number. Then, fewer incisions will be required for vein removal at the time of AP.

If the patient returns in the post-operative period and points out veins that were missed during AP, a redo procedure generally is not required. Sclerotherapy, with or without ultrasound guidance, can be performed four to six weeks post-operatively to remove any missed veins. As a general rule, we prefer not to combine AP with ultrasound-guided sclerotherapy of varicose veins, unless the sites are distant from one another. As stated earlier, leakage of sclerosant from fractured vein ends is undesirable. If redo

phlebectomy is required, we allow three months to elapse; this allows the inflammatory response to improve at the original AP sites.

### AVOIDING NONTARGET TISSUES

If the treating physician heeds several important suggestions, complications will rarely be encountered. The venous surgeon must have a thorough command of neurovascular anatomy to avoid injury to nontarget tissues such as arteries and nerves. Knowledge of the course of the common femoral artery, superficial femoral artery, popliteal artery, and anterior and posterior tibial arteries will keep the surgeon from injuring these structures while probing to exteriorize a varicose vein. It would be very difficult, although not impossible, to injure the profunda femoris or peroneal arteries during AP. As stated earlier, the hook rarely needs to plunge deeper than 3 mm to contact the target vein.

The saphenous and sural nerves are particularly prone to injury below the knee because of their proximity to the Great and Small Saphenous veins. If the saphenous or sural nerves are displaced by the hook, the patient usually will complain of shooting pain into the foot. This is a sign for the surgeon to gently release the structure and replace it *in situ*. The femoral, obturator, sciatic, tibial, and peroneal (common, deep, and superficial) nerves are deep and generally not disturbed in the hands of a competent surgeon. However, when placing the post-operative compression bandage, the deep peroneal nerve can be injured if the lateral fibular head is not properly padded. Occasionally, hair-sized sensory cutaneous nerves are encountered and inadvertently extracted during the course of AP. They are recognized as small threads and the patient will feel acute sharp pain. The pain usually dissipates after two to five minutes without treatment. If this occurs in the ankle and foot area, chances are that the patient will develop postoperative paraesthesias or areas of dysesthesia that in most cases will be temporary.<sup>14</sup>

### TREATMENT OF VARICOSE VEINS FROM NONSAPHENOUS ORIGINS

Bulging varicose veins on the surface of the skin can originate from different sources. Identification of these sources is important because this influences the treatment plan. Varicosities on the medial aspect of the thigh and calf are usually the result of GSV incompetence. In order to minimize the chance for recurrence, the GSV must be eliminated from the circulation. This concept has been substantiated in several prospective randomized clinical trials involving patients who were treated with or without saphenectomy by conventional vein stripping.<sup>15-18</sup> The recurrence rates for limbs without saphenectomy were much higher than those with saphenectomy. Of course, now thermal ablation

techniques with either radiofrequency or laser have proven to be the method of choice for eliminating the GSV from the circulation.<sup>19,20</sup>

Varicosities on the anterior thigh usually result from Anterior Accessory Saphenous Vein (AASV) incompetence. These veins usually course over the knee and into the lower leg. Small Saphenous vein (SSV) reflux produces varicosities on the posterior calf. When also present on the posterior thigh, the surgeon must consider a cranial extension of the SSV, which can be identified with duplex ultrasound imaging. Cranial extensions may enter the GSV (Giacomini vein) or enter the femoral vein directly.

In cases where no “feeding source” is found, phlebectomy of the varicosities may be all that is required. Labropoulos<sup>21</sup> has shown that varicose veins may result from a primary vein wall defect and that reflux may be confined to superficial tributaries throughout the lower limb. Without great and small saphenous trunk incompetence, perforator and deep-vein incompetence, or proximal obstruction, his data suggests that reflux can develop in any vein without an apparent feeding source. This is often the case when bulging reticular veins are seen along the course of the lateral leg. This lateral subdermic complex and its Vein of Albanese are often dilated and bulging in elderly patients. The underlying source of venous hypertension is usually perigeniculate perforating veins, not easily identifiable with duplex imaging. AP using an 18-gauge needle stab incision and a small crochet hook for exteriorization of the vein is an excellent procedure for this clinical problem. Perforating veins of the thigh or calf also may become incompetent and be sources of ambulatory venous hypertension. These can be treated by a variety of techniques including ligation, subfascial endoscopic perforator surgery (SEPS), and ultrasound-guided sclerotherapy (UGS).

### AP VERSUS POWERED PHLEBECTOMY

In a published prospective comparative randomized trial comparing AP with the new technique of transillumination powered phlebectomy (TriVex), there was no difference in operating time. Although an incision ratio of 7:1 favored TriVex, there was no perceived cosmetic benefit among the patient groups. There was a higher number of recurrences in the TriVex group (21.2%; 7 of 33) compared with the AP group (6.2%; 2 of 32) at 52 weeks postoperatively. Assessment of pain scores showed no difference between groups.<sup>22</sup> These findings have been supported by other investigators.<sup>23-27</sup>

It is important to point out that all Trivex procedures were performed in the hospital under general anesthesia, and the cost of disposable equipment used for the TriVex procedure was to \$314 per patient. Because the trend for venous surgery is office-based, with local anesthesia, TriVex will likely fall

into disfavor in the future if modifications for office use are ignored.

### AP VERSUS COMPRESSION SCLEROTHERAPY

The combination of compression therapy with intravenous injection of a sclerosing agent for the treatment of varicose veins was introduced in 1953.<sup>28</sup> Early studies indicated compression sclerotherapy (Sclero) would be an efficient addition to varicose vein surgery practiced at that time. Although ambulatory phlebectomy was “invented” around the same period,<sup>2</sup> this technique required considerable time to become well-established worldwide. There is one randomized controlled trial on recurrence rates and other complications after Sclero and AP. A total of 98 operations were randomized to either AP (n = 49) or Sclero (n = 49) in a total of 82 lateral accessory varicose veins (LAVs). In this study, polidocanol was used in a 3% solution (Aethoxysclerol; Kreussler & Co., Wiesbaden, Germany), which is equivalent to 1.5% sodium tetradecyl sulfate. One year after Sclero, 12 LAVs had recurred (25%), and only one postphlebectomy LAV (2.1%). After two years, the difference in recurrence was even larger because another six recurrences developed, making a total of 18 recurrences in the Sclero group (37.5%) and only one recurrence in the AP group (2.1%). The authors of the study concluded that AP is the treatment of choice for LAV.<sup>29</sup>

### AP FOR OTHER AREAS OF THE BODY

#### Foot

In recent years there have been several publications on the use of AP for the treatment of varicose veins of the foot and ankle region.<sup>30–32</sup> There are patients who present with serious phlebologic complaints of varicosities of the foot and ankle region that can be alleviated through simple treatment. The venous anatomy of the foot with many parallel veins is complicated; however, safe treatment is possible.

The skin of the foot is thin and fibrotic. Further, there is minimal subcutaneous fat, less protection against trauma of the skin, and important underlying tissues such as tendons, tendon sheaths, and joints. There are more small nerve branches that can be damaged by the hook. As in the popliteal space, there is greater risk of injuring an artery. Moreover, it is possible to grasp and avulse a tendon.

#### Eyelid

Many ophthalmic plastic surgeons and dermatologic surgeons experienced in sclerotherapy avoid the use of this

agent near the eye or use it in substantially lower concentrations and volumes. This is due to fear the solution may travel to unintended areas of venous circulation such as the central retinal vein, choroidal vortex veins, or even the cavernous sinus via valve less anastomoses.<sup>33</sup> Blindness has been reported following STS injection into a venous malformation partially located in the orbit.<sup>34</sup>

Ambulatory phlebectomy of the periocular vein avoids the concerns regarding thrombotic phenomena within ocular, orbital, or cerebral veins possibly associated with periocular vein sclerotherapy. Weiss<sup>35</sup> reported excellent results on 10 patients who underwent removal of periocular reticular blue veins by AP. A single puncture with an 18-gauge needle sufficed in most cases. It is important to attempt to remove the entire segment, as partial resection may lead to recurrence. The use of postoperative compression for 10 minutes reduces the incidence of bruising. The puncture sites typically disappear quickly without leaving scars.

#### Hands

In general, inquiries about hand vein treatment come from elderly women who find them unsightly. Often, they have had prior facelift surgery and worry that their hands need rejuvenation to complement the face. Our initial consultation stresses the importance of hand veins for reasons of intravenous access, furthermore, removal of these veins may require central venous access should the patient be hospitalized in the future. If attempts to dissuade the patient fail, we recommend AP as the procedure of choice for hand vein removal. It is performed identical to leg vein treatment, and closely resembles treating the dorsum of foot because of the thin skin overlying the area. Results have been excellent.

### OFFICE-BASED AP WITH TUMESCENT ANESTHESIA

Although there are reports of death and serious complications with tumescent anesthesia, these have largely been found in the plastic surgery literature.<sup>36</sup> Complications are described when tumescent anesthesia is used in conjunction with intravenous sedation, and/or general anesthesia.<sup>37</sup> Coldiron et al. recently studied State of Florida data over a four-year period to help clarify actual adverse events occurring in the office setting. There were 77 events reported to the Florida Agency for Health Care Administration (ACHA) from March 1, 2000 to March 1, 2004. Liposuction performed under general anesthesia was the most frequent procedure reported. Five reported deaths and 14 transfer incidents occurred as a complication of liposuction (with or without another associated procedure) under general anesthesia or deep sedation. According to the Florida data, there

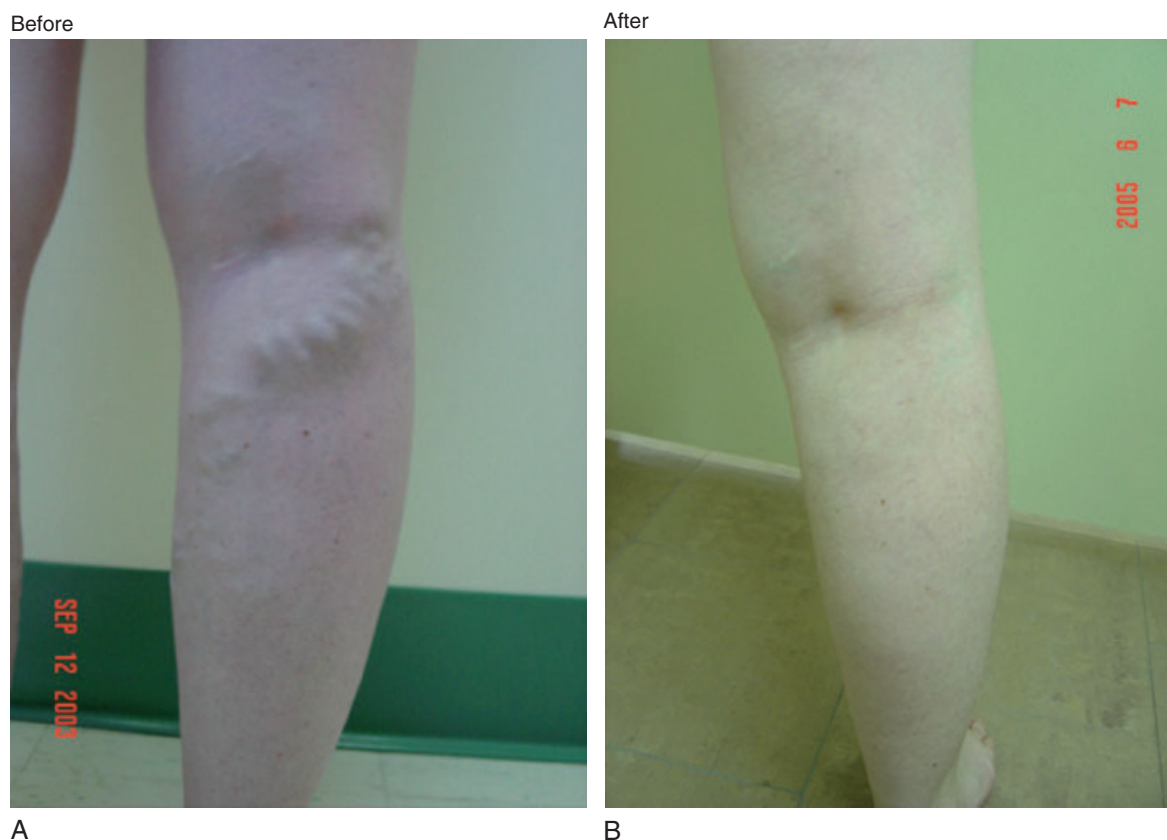


FIGURE 27.4 Before and after photo.

were no problems associated with liposuction using dilute or tumescent anesthesia.<sup>38</sup> Similarly, a malpractice claims study by Coleman and colleagues study supported the safety of office-based liposuction performed by dermatologists using tumescent anesthesia for small-volume fat removal.<sup>39</sup> In addition, Housman and colleagues surveyed 261 dermatologic surgeons performing a total of 66,570 liposuction procedures and found a low rate of serious adverse events (0.68 per 1,000) and no reports of associated deaths.<sup>40</sup> All three studies support the safety of tumescent liposuction performed by dermatologists in an office setting.

Because the tumescent anesthetic technique for venous procedures has been adopted from the liposuction community, we feel these data are relevant to subcutaneous venous surgery using dilute tumescent anesthesia. There have been no adverse events reported to the Florida ACHA as a result of varicose vein surgery using tumescent anesthesia.

Advantages of office-based surgery are ease of scheduling for doctor and patient, less paper work (unnecessary duplication of information and record keeping), no waiting for other surgeons to finish their operations, elimination of travel time, and cost containment for the healthcare system. Furthermore, a staff that performs the same procedures daily is more streamlined and safe.

## CONCLUSION

Ambulatory phlebectomy is elegant by its mere simplicity. It is effective and safe with acceptable cosmetic results (see Figure 27.4). AP is a perfect complement to endovenous thermal ablation of the saphenous veins. With this combination, patients can expect all varicose veins to vanish following a one-hour procedure that employed only local anesthesia, in the comfort of a physician's office.

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