

Successful Endovenous Ablation

Is it the technology or the technique?

PANEL



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Moderator: Traditional surgery emphasizes technique over technology because the technology used is minimal (eg, clamps, sutures, ties, etc). Have we gone to the other extreme with minimally invasive venous ablation procedures? Are we highlighting technology more than technique?

Dr. Almeida: Technique and technology go hand in hand: a tool is only as effective as its user. Minimally invasive techniques have developed thanks to wonderful technology, allowing patients to get back on their feet immediately. However, technology in the wrong hands can be dangerous, just as is the case with old-fashioned surgery. In the endovenous world, one must master ultrasound in addition to catheter-based techniques. Technology will continue to

evolve to the benefit of patients, but without a savvy operator, technology is worthless.

Dr. Morrison: I agree, the tool is only as good as its user. As technologies advance, those of us who keep up with the advancements, accept and utilize the new products. I'm not sure that it makes our job any easier, but it makes the procedure easier on the patient. It still requires someone with hands and a brain attached to make it work.

Dr. Gloviczki: If the key to progress is to apply new technology, then it should be tried. However, new technology is introduced with a definite purpose: to provide better care to our patients, to ensure more rapid recovery and less pain,

and to achieve the same or better outcome than conventional techniques. We should never lose sight of the patient, and that is why introducing new technology is so difficult. Before I do, I always ask myself if I would use a specific new technology on a member of my family.

Dr. Elias: I think ultrasound is one of the technologies that we take for granted when we talk about endovenous ablation. Some physicians may not appreciate how important a good ultrasound is (conducted either by the physician, or by the technologist) to effectively perform these procedures. Nick, you've addressed this point in the past. Please share with us some of your ideas.

Dr. Morrison: I recommend that physicians performing endovenous ablation have the best ultrasound technology they can afford because the quality of the equipment really makes a difference. We conducted a study of six patients with moderate reflux and looked at them with five different machines—all commonly used in practices—and there was really a significant difference between the most sensitive and least sensitive equipment. The most sensitive equipment picked up the reflux in all of the patients, whereas the least sensitive picked up reflux in 62% of the patients—there was a 38% miss in the least sensitive equipment with respect to ultrasound. That is not to negate the expertise of the person doing the study; it is critically important that the person performing the ultrasound be knowledgeable about the anatomy of the superficial and deep systems, but also able to deliver the kind and quality of information necessary to do these minimally invasive procedures. Personnel is as important as the quality of the technology.

Dr. Głowiczki: Dr. Morrison brings up an important issue of preprocedure evaluation of the venous system with duplex scanning. This has to be performed by highly trained technologists and expert physicians, using the best available ultrasound machine. We do a detailed examination that includes saphenous vein size, its distance from the skin, and the presence of valvular incompetence at the saphenofemoral junction and at multiple levels of the thigh and calf. We also study the deep veins for obstruction and incompetence. However, for the ablation procedures, my colleagues and I currently use easily portable smaller machines, without using a technologist. I believe that is entirely satisfactory.

Dr. Stoughton: I agree that we cannot lose sight of how important our technique is, despite the advances in technology. Patient selection and ultrasound evaluation are vitally important in achieving the best outcomes, and both require an expertise that cannot be replaced by our advanced technology.

Moderator: What kind of training do the physicians need in order to perform these procedures? There are a number of training courses, but what do you see as absolute requirements for developing sufficient experience?

Dr. Almeida: When I first started working with ultrasound, I had a part-time technician who would help me. As the practice started growing, 10 patients would be scheduled for venous ultrasound on a typical day. There were days when my technician would call in sick, and rather than cancel those patients, I would perform the ultrasounds myself. Although I had formal noninvasive laboratory training during my vascular surgery fellowship, venous ultrasound was self-taught. As with anything, the more you practice, the better you get. Currently, I am dependent on ultrasound for vein work, as it allows me to look inside and functions as “my eyes within the leg.” For a technician to try to convey an ultrasound image (on paper) to a working surgeon is almost impossible. The surgeon really has to be able to scan the leg himself, make an assessment, and use the ultrasound as a tool. It is the most critical part of vein work, from preoperative to intraoperative to postoperative. I know some people have technicians do the work for them—both in diagnosis and intraoperatively—but, I personally am emphatic that the doctors should learn how to do the ultrasound work themselves to have a much better understanding of the process.

Dr. Morrison: I do things a bit differently. I know how to do the scans and use the equipment, but I'm not all that good at it because I have not practiced enough. At our facility, the technologist who does the diagnostic work also does the therapeutic work. They know exactly what information I need, and they know how the information will be used. They produce a scan, come to the operating room, and back up that scan with what we find during the procedure. We have four or five technicians who work with us all the time, and they are all comfortable moving from diagnostic to therapeutic work. But the very intimate relationship in which they look at the scan and reproduce it for the operating room is essential. If it were more hands-off, or if you have to send your scans elsewhere for diagnosis, I agree with Dr. Almeida, it just will not work. If these procedures are unbundled and staged, they will be less effective.

Dr. Stoughton: I am mostly training other surgeons, especially the residents and fellows who already have some of the essential catheter skills in place. Some of the physicians who do not have the endovascular training have difficulties with the wires, dilators and sheaths, but practice on the side table usually suffices for most. I also find the ultrasound an essential

tool, and I believe it is best done as an extension of the surgeon's nondominant hand. The fine-tuning and adjustments needed while doing the procedures are much easier to negotiate without having to describe in words what needs to be done. This, I find, is the most difficult part to teach, and requires the most practice.

Dr. Elias: I also involve the technician in the procedure, and at this point, the technicians are probably as good as I am. Both Dr. Almeida and Dr. Morrison bring up the point that the eyes that make the diagnosis should be the same eyes that are doing the scanning during the procedure and studying the patient postprocedure. This way, the data are evenly distributed from diagnosis to treatment to posttreatment.



Dr. Elias

"I agree; ultrasound proficiency is definitely the main skill that practitioners need to accomplish first."

Dr. Gliviczki: I did my first 50 endovenous ablations with a vascular radiologist who scrubbed in with me and with a technician who worked at the machine. Now, I do it with a vascular surgery fellow or general surgery resident. I feel very comfortable with this tool. Nothing is written in stone about guidelines just yet but, you should have someone experienced in ultrasound readily available to help you for the first 20 cases.

Moderator: What are the common requirements of any endovenous ablative technology? Have you had experience with more than one type (laser, radiofrequency [RF], or foam)?

Dr. Almeida: We have had experience with endovenous laser, RF ablation, and foam. Laser and RF are thermal ablation tools because they deliver heat to damage the vein wall. Foam sclerotherapy is a chemical ablation tool because it uses pharmaceuticals to damage the vein wall. Laser and RF are very comparable. Laser is more versatile in my hands because the profile size of the fiber is smaller. When I ablate multiple veins during one procedure, I like the smaller profile because some targets are small tributaries or perforators. The laser aiming beam allows me to better assess the position of the fiber tip during positioning and pullback. RF is

another great alternative, but it has more nuances to deal with. We certainly see great results with both devices. I tend to reserve foam for tortuous veins that I cannot get a straight device into. I think thermoablation does a better job with saphenous-type axial veins, especially when they are larger than 12 mm. We know that foam has limitations for a saphenous vein larger than 12 mm in diameter. Foam is a great adjunct to thermal ablation, especially for the treatment of tortuous segments, but the savvy operator should be aware of its limitations.

Dr. Elias: I think the main requirement is some source (eg, laser, RF, chemical energy) that gives enough energy to damage that vein such that it will sclerose down and seal shut. The balance comes from what one energy does versus another in terms of any complications and occlusion rates and bruising, etc. Some do a better job in terms of long-term occlusion rates (laser>RF>foam) but, because they give more energy, patients are slightly more tender after treatment (laser>RF>foam). I use both laser and RF and have had this experience.

Dr. Morrison: I agree; I think the foam is still a ways off in the US from a practical standpoint. There are some issues that have to be worked out, not the least of which is reimbursement. I think that foam will be part of our armamentarium, but I'm not sure that foam for saphenous truncal ablation is here full-force yet.

Dr. Stoughton: I use all types of thermal and chemical ablation as well. The thermal ablation techniques (RF and laser) have nearly the same requirements and inclusion criteria. I reserve chemical ablations as a secondary procedure when thermal ablation is not an option. Foam sclerotherapy is generally less successful in treating the larger veins in a single session.

Dr. Gliviczki: We have had experience with both RF ablations and with endovenous laser therapy. Both are less invasive than surgery although clearly, in my experience, there is still a need for invagination stripping in some of my patients. Laser is faster and easier to use than RF, so that is what we have accepted now in our group. Dermatologists at my institution use RF ablation, so both are good and effective devices.

Moderator: You have all been early adopters of endovenous ablation and have gone through the initial learning curve and are now training fellows, residents, and practicing physicians. What are some of the key points in technique that should be emphasized to maximize their results and shorten their learning curve?

Dr. Morrison: Ultrasound is key. If someone comes to me with ultrasound guidance skills, they are a long way ahead, and they are going to become skilled quicker than someone who does not have ultrasound guiding skills. Now, having said that, the majority of practicing physicians who come to me do not have ultrasound skills, which must be taught, and I tell them the quickest way to gain those skills is to practice with ultrasound-guided scanning and injection or passage of the catheter—all of those require the necessary skill. The quicker you can get that skill, the quicker that all of these procedures will become much easier for physicians.



Dr. Almeida

“To shorten the learning curve, one should try to see as many cases as possible under the tutelage of an experienced surgeon.”

Dr. Elias: I agree; ultrasound proficiency is definitely the main skill that practitioners need to accomplish first. Once they overcome that, I don't think that they appreciate the importance of the tumescent anesthetic not only as an anesthetic but equally as important as the main method of vein exsanguination, prior to energy delivery. This is important because you have to get whatever endovenous device you are using to touch the vein wall and, early in the learning curve, people tend to have some extra blood in the vein, and we need to stress techniques to exsanguinate the vein prior to treatment.

Dr. Almeida: To take a different stand, many doctors will pick up the techniques rather rapidly, but I hear the beginners have the most problems knowing “what to treat.” It is critical that they correlate the clinical map with the ultrasound map before beginning any procedure. We are usually dealing with a straightforward saphenous vein, however, tortuous segments and perforators play a role in the disease process, and we try to determine ahead of time what we want to treat. Most training involves differentiating normal from abnormal, and then going from there. To shorten the learning curve, one should try to see as many cases as possible under the tutelage of an experienced surgeon.

Dr. Gloviczki: I agree with both Drs. Almeida and Morrison. Patient selection is very important, as is ultra-

sound skill. In addition, the surgeon should be an expert in venous disease, and the patient should be educated about risks, benefits, and expectations.

Dr. Morrison: People who have been in the office to train tell me that the more they learn about this entire field, the more they realize how complex it is. Many times, vascular surgeons and cardiothoracic surgeons come into the office expecting that they know everything about veins and need only to hone the techniques, but the fact is that venous work is more complicated than many people realize at first.

Dr. Elias: I think you bring up a good point. Various specialties bring different knowledge levels. Obviously, some people have better catheter skills than others in the beginning, yet they may not know the venous system as well as physicians in different specialties. I think that at some point, they all get down to the same understanding: this is much more than I thought it was. The issue of when to treat abnormal veins, what veins you must treat, and what veins can be followed and treated later—this takes experience with patients.

Dr. Stoughton: I agree, the essentials in training include the understanding and skill in performing ultrasound, the catheter skills to negotiate the veins, and the understanding of the anatomy and pathophysiology that helps us in patient selection and choosing which technology fits best. The people I train are varied in their skill sets, and they need to master all three components before they can be comfortable in the comprehensive treatment of venous disease.

Moderator: Do you feel certain anatomic or clinical settings lend themselves to the use of one endovenous device over another (ie, neovascularization, large veins, postsclerotic/thrombotic veins, the small saphenous vein, perforators, or tortuous axial veins)?

Dr. Gloviczki: I caution all beginners not to start with aneurysmal saphenous vein or with one that lies immediately under the skin in the distal thigh. Venous aneurysms tend to develop larger clots that are prone to embolize, whereas treatment of very superficial veins may result in heat injury to the skin or in the formation of a palpable cord.

Dr. Almeida: I have a little adage: “if it's straight, burn it; if it's tortuous, foam it.” Straight axial veins, in general, will close with any thermal ablation device. You want to deliver enough energy to damage the vein wall, and right now, I think thermal ablation is probably the most reliable source of energy to irreversibly damage the vein wall. Thermal

ablation devices do not navigate tortuous veins, however, and that is where liquid or foamed sclerosants are useful. The advantage of foam is that it is visible by ultrasound, therefore, one can actually “massage it” into the target vein. There are some new devices out there for perforators, but I find them a little cumbersome, so I usually use foam sclerotherapy for perforators, and select the concentration based on vein diameter.

Dr. Morrison: I agree, and I will address our efforts with laser. In experienced hands, there is little difference between any laser modality. I think a larger vein is more easily treated with a laser than with an RF device. I have seen the different manufacturers vary in terms of the quality of the training that they provide on their device, and I think that all of us have seen that the RF company has led the way in terms of training—mainly because they have to keep selling catheters and need to be better than the rest because neither they nor any manufacturer can claim a more significant clinical outcome. What they hope will differentiate them from laser companies is their support and training. Some laser companies are now very effective with training and some are not quite as good. I tell people that it depends where you are on the curve; if you are at the start of the learning curve, you need to be aware of which company you buy your equipment from because the training varies.

Dr. Elias: In terms of the anatomic “clinical” settings in which one device lends itself more than another, I think that larger veins (>12 mm) are easier to close with laser. It is possible to close larger veins with RF ablation, but it requires more work. In terms of perforators, I will say that I have had a lot of experience in the past 10 months with both the RF device and lasers, and I do not see any difference in the results of the perforator. At 6 months, approximately 90% have remained closed. I tend not to use foam; I use either RF or laser, and with enough energy using either one, the perforators have remained closed.

Dr. Morrison: I tell people who train with me that, realistically, you have to look at reimbursement issues—if you get reimbursed well for using a catheter procedure as opposed to poor reimbursement for an ultrasound-guided foam sclerotherapy procedure, you should probably consider the catheter procedure in that situation when the clinical outcome is similar.

Dr. Stoughton: I use the laser more often for the larger veins or multiple vein segments. I find the smaller, more superficial veins have less of a phlebitic reaction after RF ablation. The foam is reserved for tortuous segments, neovascularization and, at times, the smaller perforators. I tend to use RF for

the larger perforators because I think it is easier with the new short catheter, and I like having the impedance feedback telling me I am still in the vein. In general, I think thermal ablation works better than foam for perforators—not just from a reimbursement standpoint but from a practical standpoint—to have it done in one setting rather than having to ablate the perforators chemically a few times.

Dr. Glaviczi: I use the laser for main or accessory saphenous veins, and I continue to use the SEPS procedure in patients who need perforator interruption because of advanced (class 4-5-6) disease. A thorough treatment of all medial perforators can easily be done with this minimally invasive outpatient procedure, with excellent results of ablating clearly more perforators than with any other technique.

Moderator: I think each of us has gotten through the learning curve and are where we should be regarding getting good results from the technology that is currently available. The results with laser ablation have been good—between 97% and 98% at 1 year. RF tends to be a little lower, somewhere in the 93% range at this point, and this is what I call the modern era of ablation in terms of achievable results—not when everyone was still learning how to use the technologies. The numbers from the long-term studies of success rates of laser and RF show numbers that are a little lower, but that was because we were all learning. These data come before the “modern era” of endovenous ablation. The more recent numbers show a more accurate reflection of the current success rate. What are your best results and/or reported results with the various technologies?

Dr. Almeida: It is important to differentiate ablation as an absolute percentage versus a Kaplan-Meier life table curve. Our 5-year results differ slightly when we look at absolute percent ablation (number of veins closed divided by the number of veins treated) versus our life table curves (number of veins closed divided by the number of veins at risk). With absolute percent ablation, success is about 98% for laser and about 92% for radiofrequency. With the life-table method, these numbers are slightly lower. The main point I want to make is that we can generate a primary closure rate and a secondary closure rate akin to the way we follow primary patency and secondary patency for arterial bypass grafts. Veins with recanalized segments can be easily rescued, usually with a quick adjunct such as ultrasound-guided sclerotherapy. Therefore, a primary closure rate of 95% can be corrected to a 99% secondary closure rate with a simple injection. I believe this is the most important advantage of endovenous therapy, that the few failures that do occur are easily rescued with an injection of foam.

Dr. Morrison: If you follow patients closely, with good equipment, and with careful follow-up and adjunctive ultrasound-guided foam sclerotherapy, you can bring your results up very nicely. I can't tell that there is much difference between the three modalities' success rates. One of the problems, however, is that the definition of success is not comparable at all and, in a way, we are comparing apples to oranges. But, with careful follow-up, your results can be very good.



Dr. Głowiczki

"I caution all beginners not to start with aneurysmal saphenous vein or with one that lies immediately under the skin in the distal thigh."

Dr. Stoughton: Our results have been quite promising as well, with more than 4-years of follow-up. We have more than 90% of our patients followed-up at 6 months and 1 year, and it drops off after 2 years. The early failures and complete recanalization rates are very low (1% to 2%); these patients have typically been retreated with nearly 100% success (secondary closure). Our partial recanalization rates after laser ablation have been approximately 3%, and after RF, they have been approximately 9% to 10% at 1-year or longer follow-up. These failures have generally occurred in the first 6 months, and they have been successfully treated with ultrasound-guided foam sclerotherapy to achieve approximately 98% primary-assisted closure rates. I find it is essential to make sure that the laboratory doing the follow-up studies is accurately looking at the vein that was treated. One of the problems with reporting success or failure occurs when they may report patency of a secondary vein, yet call it the saphenous vein. It does become difficult after a year or so when the treated vein becomes more difficult to visualize. We have also seen some increase in neovascularization in those patients who were treated with saphenofemoral ligation with ablation in the long-term follow-up (3 to 5 years). We are still collecting these data and will be reporting them shortly.

Dr. Głowiczki: Early results with both techniques have been quite convincing. Because of the shorter convalescence, there is now evidence that RF ablation results in cost savings for society. Laser has produced similarly good results; in the international registry of Kabnick that involved 5,262

patients, the initial occlusion rate was 96%. We reported a 94% early saphenous occlusion rate after laser treatment.

Moderator: If you had to choose between the perfect technique or the perfect technology, which would you opt for?

Dr. Elias: Ideally, I think we would like every technology to not be dependent on the user to get the same results; in a perfect world, you would want foolproof, flawless technology. But in reality, I'm not sure we have reached the perfect technique or the perfect technology just yet, although we are close with both.

Dr. Almeida: If all legs were exactly the same, one might be able to invent the perfect technology. However, by ultrasound, no two legs are alike. It is impossible to apply a perfect technology to differing anatomy. It really is about developing one's skill level and applying the technology appropriately for each situation encountered. Ideally, newer devices will cause less of an inflammatory response while maintaining excellent vein closure.

Dr. Stoughton: I find this to be a challenging question. If one has the perfect technology, one may not need the best technique, and with the ideal technique, one can achieve good results with a suboptimal technology. I agree with Dr. Almeida that the anatomy is so different in all these patients that the technology alone cannot adapt to each patient without some kind of refinement in our technique. Although they are inversely related, we need to maximize both, if possible.

Moderator: The technique for ablation can be separated into four distinct steps: access, position, exsanguination, and treat (APET). What are your pearls regarding endovenous ablative technique, both those that are common to all technologies and those that are unique?

Dr. Almeida: The operator should be in a comfortable position, pick the access site wisely, have a warm room with a calm patient, and enter the vein on the first stick. The micropuncture needle allows easier entry into small veins. Energy delivery with RF was originally with 85°C, however, most of us have gone to 90°C to allow quicker pullback of the catheter. With endovenous laser, there are studies out there showing that between 60 to 80 J/cm of energy delivered to the vein is best, however, I tend to deliver only 50 J/cm for routine veins and deliver more energy to larger veins.

Dr. Stoughton: All of these techniques have access in common, which can be the most challenging for the begin-

ner. The first attempt is the best opportunity to enter the vein before it goes into spasm. Visualization is important, as is having all the equipment (wires, micropuncture kit, dilators, sheaths, etc) ready prior to the venopuncture. I try to stress the importance of taking one's time when getting into the vein, waiting until one can see the vein wall "tented" by the needle. The wire should be threaded carefully and the position checked with ultrasound after each step. With thermal ablation techniques, the delivery of tumescent anesthesia to exsanguinate the vein and create wall contact is important. Using the two-hand technique and doing your own ultrasound helps with obtaining access and accurately placing tumescence. With RF, I apply pressure with the ultrasound probe to keep the impedance (wall contact) higher while withdrawing, and I tend to use 90°C. With laser treatment, I use 50 J/cm in the smaller veins, and up to 100 J/cm in the larger veins.



Dr. Morrison

"When physicians come in to train, I tell them that their starting point makes a big difference."

Dr. Glociczki: Using the micropuncture kit has changed our immediate technical success in cannulation a lot. I would encourage the manufacturers to change the kits and forget the .038 system. That could speed up the process and save a step in treatment. The second important point is placing the tip of the laser through the sheath to the appropriate position in the saphenous vein. For us, it is 1 cm distal to the confluence of the superficial epigastric vein. I find it imperative to check this position after the perisaphenous infiltration with tumescence anesthetic solution, before the laser is turned on. The third point to remember is to pull back the sheath and the fiber always together, to avoid slipping the laser into the sheath and burning off a piece of the sheath that can stay behind after treatment.

Dr. Elias: In terms of positioning the catheter in relation to the saphenofemoral junction or saphenopopliteal junction, I have found that with the laser as opposed to RF, where you are just distal to the superficial epigastric, one needs to be about 1.5 cm to 2 cm away from the junction with laser. When I scan postablation at the time of the procedure, that segment of closed vein has crept closer to the junction than where I started. We all know about the entity of endovenous heat-induced thrombus that projects into the saphenofemoral junction after treatment.

There is a little encroachment proximally; when you re-image you actually lose .5 cm of vein that you initially left open. I tend to start a little more distal, around 1.5 cm to 2 cm from the junction with laser, as opposed to RF, for which I will go just distal to the superficial epigastric. Having done this, we are always left with this nice little stump of saphenous vein with flow into the superficial epigastric no matter what energy type was used.

Dr. Stoughton: After I treat with the laser, I find there is some artifact, perhaps from the steam bubbles and tumescence. We do see 1% to 2% of patients with an extension up to the saphenofemoral junction, which is usually hyperechoic, on the 48-hour scan that we do postoperatively. This is generally observed and resolves without anticoagulation as long as there is no extension into the lumen of the common femoral vein. This is a rare event, and I have not noted a difference in laser-treated patients versus the RF-treated veins. Usually, I teach people to aim for just beyond the superficial epigastric vessel and 1.5 cm to 2 cm from the saphenofemoral junction, or whichever is farthest. In the short saphenous system, I tend to stay more superficial and distal to the saphenopopliteal junction. I try to preserve all the inflow from the gastrocnemius and posterior thigh communicating veins if possible.

Dr. Morrison: If foam becomes available to us for truncal reflux disease, a lot of these technical considerations that are part and parcel of laser and RF ablation will not be an issue, such as tumescence and distance from the saphenofemoral junction. Of course, foam will bring its own set of considerations.

Moderator: Are we as good as we can get, or is there room for improvement? For example, should our goals be a completely noninvasive method of ablation with results as good as we have now—a completely exogenous source to ablate veins? Is a completely noninvasive method possible?

Dr. Elias: I think the direction that we should be moving toward is the development of some completely noninvasive method to cause intimal damage and vein shrinkage. To me, that means going from a minimally invasive technology to a completely noninvasive technology. The next step would allow complete noninvasive ablation of the abnormal venous segments. I envision some external source being placed outside the vein and destroying the wall from the outside.

Dr. Almeida: On a personal level, I think I keep getting better by incorporating more adjuncts into my treatment.

Most of them involve treating multiple tributaries and perforators at the same treatment setting using three basic tools: thermal ablation, foam sclerotherapy, and phlebectomy. The future probably involves identifying cytochemical markers on the venous endothelial surface that allow the differentiation of diseased veins from normal veins. One could then deliver endoluminal therapy, using products generated from molecular engineering techniques or nanotechnology, to destroy the venous abnormalities.



Dr. Stoughton

“It makes financial and practical sense to do most cases in the office where things can be done efficiently, and the patients prefer staying out of the hospital...”

Dr. Stoughton: One of the most recent advances has been our attempt to treat all the sources of reflux rather than treating a single vein at one time. We have, perhaps, gotten as good as we can get, however, the ideal situation would be a method of ablation that does not require tumescent anesthesia. We have been looking at the use of foam sclerotherapy, but we do not yet have the perfect technology or sclerotherapy agent. Perhaps we will find a completely external method of ablation, almost like what lithotripsy has done for kidney stones. The thought is intriguing, but at this point, I would just like to aim for a highly successful method of ablation (whether intra- or extraluminal) that can eliminate the most painful part of the procedure, which is the injection of the tumescent anesthesia.

Dr. Glociczki: I think there is still plenty of room for improvement. I mentioned before some technical modifications that could improve treatment. Recent publication suggests that using higher doses of laser energy increases success and reduces the recanalization rate at 1 year. I am sure we will be closer to select the best wavelength for optimal treatment. There is also a new phase 1 trial going on with a modified hot tip RF device. I like the idea of the foam because it is the least invasive of all techniques discussed, but I am still concerned about the potential side effects of getting the foam into the deep veins of the leg and, more importantly, into the arterial circulation of the lungs, eyes, and the brain.

Moderator: What endovenous device should a physician who is new to endovenous ablation buy? Should new adopters be more technology-focused, or should they seek support from these device companies to help develop and grow their practice?

Dr. Morrison: When physicians come in to train, I tell them that their starting point makes a big difference. If they have some ultrasound-guided skill and they are comfortable with a private practice, they should choose one device over another. If they have a little less skill, they may need a bit more help and guidance from the other companies. Some of the companies are very good about providing that training and support—including marketing support—afterward. You can talk to those companies and decide on your own where you will fit best.

Dr. Stoughton: Part of the answer with regard to the best technology has to do with the data, although it is difficult to say that one technology is better than another at this point. We are starting to see some trends, and we have to consider the practical aspect: What is more versatile, faster, and more economical per case? All of these things are important, in addition to the amount of company support received. Will they perform procedures in the office or the operating room? In my practice, I have both RF and laser, and I do not think laser wavelength matters. If you could have both, that would be ideal, but most people cannot. All the devices seem to be close, some are perhaps better in different clinical situations, as we have discussed. We will need to continue to collect data to help determine which device/choice is actually optimal. I usually suggest that they try several cases with a few of the different companies. They should then consider their experiences during the trial, taking into account all of the practical and economical aspects to help make their decision.

Dr. Almeida: One of the first things to decide regarding device selection depends on where you are on the learning curve. We all agree that the company who sells RF devices probably offers the most support and training to new users. Regarding laser, we do not know whether one wavelength is better than the other—so beware of clever marketing.

Dr. Elias: I agree, and I think the issue of support is extremely important. The issue of cost may also be important to some people. Obviously, some catheters cost more than others, and it depends on the number of procedures you plan on doing. With regard to results, I do not think any of us can say that one device stands out better than any other on the market. The results are all within the

same range, and we can certainly rescue patients who can be recanalized.

Dr. Glociczki: Physicians and not device companies should guide us on optimal treatment. Do not expect that your device manufacturer will ever recommend you another company for better treatment of the disease. Societies like the American Venous Forum and the American College of Phlebology should develop guidelines and credentialing criteria, and we all should strive to treat our patients based on peer-reviewed evidence, combined with critical knowledge of our own skills and respecting our patients' preference.

Moderator: Regarding the issue of reimbursement, what are the pertinent issues for physicians to consider?

Dr. Almeida: If you are performing these procedures in the office, you need to treat it as a business, adjust your mind as such, and realize that you have an overhead and a working margin. If you are getting reimbursed a particular amount from an insurance company, you have to watch what you are spending per case. One must optimize case turnover to get more work done per unit time. There are multiple considerations as far as staffing. Economics plays an important role in the game of veins.

Dr. Stoughton: In our area, reimbursement for RF and laser are close; RF reimbursements are slightly higher, and RF costs a bit more. We do not find a big difference financially between the two technologies. We have our own custom procedure packs now, and we try to keep the costs down with that. Reimbursement is higher when doing the cases in the office, but this is needed to cover the costs of the equipment and personnel for each case. It makes financial and practical sense to do most cases in the office where things can be done efficiently, and the patients prefer staying out of the hospital whenever possible. Additional equipment purchases for the office need to be considered including an accurate yet affordable ultrasound technology, and one needs to decide whether or not they choose to use a pump for tumescent anesthesia. I have found the pump invaluable in saving time during the ablation cases and for the ambulatory phlebectomies.

Dr. Elias: This is a business, and you have to run it as a business, but many people make the mistake of chasing where our money is coming from, meaning third-party payer, even through some of us do not participate with insurance. That is where we should be heading because then it does not really matter what reimbursement from insurers you are getting. With patients who have out-of-network benefits, and if you do not participate with insurance, you are in control of your over-

head, what is coming into the practice, and your billing. If I had the choice, I would not chase reimbursement per se because it changes yearly. We want to become independent of third-party insurers and see what works for individual physicians and their practices, try to be independent of insurers, and try to see what your individual patient markets will bear and what you can successfully charge.

Dr. Glociczki: I would add that I think this is primarily patient care, but it has an important business aspect. No office or hospital can afford losing money on patient care when we talk about superficial venous disease.

Dr. Stoughton: It is difficult in my area to become separate from the insurance when billing for these medically necessary procedures. A portion of my practice is hospital-based and patients are responsible for my fee, the facility fee, and perhaps an anesthesia fee. It is not practical to charge patients for all of this when their insurance usually covers this. Certainly, for cosmetic procedures, we do not involve the insurance, but if they have documented venous insufficiency, I believe these cases are medically necessary, and we do bill the insurance. I agree, it is much easier to fix the prices to cover the costs without having to worry about the third-party payers, and this may be necessary in the future if the reimbursements continue to decrease.

Dr. Morrison: I hear this all the time from practitioners who say, "There's no way this will work in my area." We have been out of insurance for 7 years, and I have given up trying to figure out which patients will stay with us and which will have someone do it under insurance. It is astounding to me the people who decide to have us do it. I cannot predict who can afford it and who cannot. Some people come in weekly and pay cash for my services. The quicker you can move in that direction, the happier you will be in the long term.

Dr. Elias: That is exactly the point I am trying to make. It is great to be promised from insurers what you will get now, but that does not always mean you will get it now, or 1 to 2 years from now. I, too, am surprised who will pay and who will not. We should try to become somewhat independent of the insurers in the long run. That, to me, would be the best goal for reimbursement. In summary, endovenous ablation is quite good. We have identified skill sets needed, and we have highlighted the benefits of each technology. They all have a place. Practice makes us better. For the future of venous disease management, what it comes down to is this: respect the elders, embrace the new, and encourage the improbable and impractical without bias. That is really how patient care improves. Thank you all. ■