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Building Your DVT Practice

There are an estimated 500,000 to 800,000 patients diagnosed with deep vein thrombosis (DVT) annually in the US. The vast majority of these patients are treated with anticoagulants and compression stockings. In the past, catheter-directed thrombolysis (CDT) was the only tool available to endovascular specialists seeking to treat these patients. The long ICU stays and high bleeding risks associated with CDT have often restricted endovascular referrals to those patients who have developed extreme swelling and have failed to respond to anticoagulants. This, in turn, has created major obstacles to any endovascular specialist seeking to build a DVT practice. The introduction of technology that avoids the limitations of CDT while providing patients with a safe and effective alternative can play an integral role in developing a successful DVT practice.

The articles below capture the experience of three different interventionists who have used technology and simple communications skills to build their DVT practice. E. Brooke Spencer, MD, is an interventional radiologist whose experience can be useful to interventional radiologists unaccustomed to marketing their practices to other specialists. Frank R. Arko, MD, and Charles S. Thompson, MD, are vascular surgeons whose experience leveraged their respective surgical bases to obtain new referrals. In addition, Michael R. Jaff, DO, provides the perspective of the referring physician. Collectively, these articles provide a roadmap for all interventionists seeking to build their DVT practice.

DRIVING SUCCESS WITH EDUCATION AND OUTREACH

By E. Brooke Spencer, MD

Endovascular treatment of DVT has become a major growth area for our interventional radiology group, which employs 14 interventional radiologists. We have treated some 60 to 70 DVT patients with isolated thrombolysis since the introduction of the Trellis device (Bacchus Vascular, Santa Clara, CA). The growth of this practice has been remarkable and by no means accidental; it highlights that DVT treatment can be an area of great potential growth for any interventional radiologist or group practice. There are several simple steps that any interventionist can do to develop a strong DVT practice.

EDUCATE YOUR PRACTICE

Isolated thrombolysis is a relatively new therapy. Therefore, any interventionist seeking referrals for DVT patients needs to be very familiar with the body of literature that supports early intervention. See Table A for education points and footnotes for my list of those studies that support early intervention in DVT patients. You should be prepared to provide clinicians with copies of abstracts (or full-length versions) of these articles.

You may also have to educate your partners in reading DVT ultrasounds. Most ultrasounds are being performed from the knee or the calf to the groin and do not examine the pelvis vasculature, thus missing iliac venous thrombosis. If the patient has thrombus from the popliteal vein to the common femoral vein, it probably extends into the pelvis, and that patient probably warrants further evaluation.

IDENTIFY THE REFERRAL BASE

The potential referring physician specialties includes hematology/oncology, emergency department (ED), hospitalists, OB/Gyn, and primary care; even orthopedists and podiatrists tend to see DVT they are not equipped to treat. These are the physicians you will ultimately need to reach if you wish to build a successful DVT practice, but it is not necessary to reach all of them to get a DVT practice started. In our experience, the hospitalists and the ED doctors are the specialists who can refer the largest number of acute patients; these are the patients for whom you can do the most good with interventional DVT treatment.

EDUCATE THE REFERRING BASE

Educating the referring physician community is paramount. For most of these clinicians, the current standard of care for their DVT patients is anticoagulation. Before I spoke with many clinicians, they did not realize that DVT could be treated in a single setting. Our discussions educated them that the negative aspects of CDT (long stays in the ICU, tying up facilities and personnel, risk of embolization, and several days exposure to thrombolytics) could be mitigated with isolated thrombolysis.

I have strongly encouraged my fellow interventionists to talk to their referring clinicians and share their excitement about this new effective treatment. Our experience shows that, in return, the clinicians will send additional patients for treatment. Of the large number of DVT patients in your area, the vast majority are probably already being treated in your hospital. The challenge is to educate their treating physicians that you can offer these patients a safe and effective alternative to the often unsuccessful treatments that

TABLE A: KEY EDUCATION POINTS

- Anticoagulation therapy alone results in worsened quality of life, lower vessel patency, and lesser symptom resolution for DVT patients.^{1,2}
- Thrombolysis, especially within iliofemoral DVT, results in greater long-term patency and symptom resolution.²⁻⁴
- PTS is a consequence of lesser venous patency. PTS has an incidence rate of between 30% and 80% within the first 2 years of DVT occurrence, has a substantial impact on a patient's quality of life, and is an underappreciated sequela of DVT.^{1,5,6}
- DVT can be treated by safe interventional techniques.⁷⁻¹¹
- Isolated thrombolysis can be done in a single setting.
- The full procedure can be done within 1 to 2 hours.
- Results are immediate, with many patients being completely asymptomatic within 1 or 2 days.
- The best chance for successful outcomes lies in treating acute patients within 10 days of symptom onset.

they are presently receiving. Unfortunately, clinicians are accustomed to treating patients with anticoagulants and, in general, they are unaware of the data that suggest that the outcomes of anticoagulant therapy are very poor. The problem is further compounded by the fact that some physicians often do not follow up with these patients to see them develop postthrombotic syndrome (PTS). So, you need to educate the referral base that PTS happens, that there is a therapy available to potentially prevent this from happening, and that you are willing to provide that therapy. See Table A for Key Education Points.

We found that the best way to reach the referral base is through outreach and communication with referring clinicians. Once we identified the potential referring clinicians, we pursued personal presentations that included both one-on-one conversations in the lunchroom and grand rounds at our hospitals. Perhaps the easiest approach for developing a referral network is talking to your hospital's ultrasonographers. Ask them to bring to your attention any patients they see with fairly extensive DVT. Read the ultrasound and make an initial phone call to the clinician, who always appreciates being told the results of their examination in a timely fashion. Suggest to the clinician that if this patient is

significantly symptomatic, he or she may be a candidate for isolated thrombolysis.

It is important to be willing to perform the DVT patient consultations, at least at first, until your referring physicians are well educated and feel confident explaining the treatment options to patients. We continue to provide consultations for our referring clinicians, and find that they have brought more business and significant patient satisfaction.

Finally, communication with referring clinicians is critical after the procedure. For example, if you treat a DVT patient referred by a hospitalist and you have a good result, it is worth the 5 minutes that it takes to call the referring primary-care doctor who will be following that patient. Discuss the procedure, as well as your suggestions for appropriate follow-up care. Informing them of successful results will lead to more direct referrals.

PATIENT SELECTION

We want to be in the business of treating acute DVT, because early interventions will usually provide the best outcomes. When you are starting your DVT practice, you need to carefully select your patient population. Results on non-acute cases will likely be less dramatic and may leave the referring physician skeptical of your ability to treat DVT patients. Try to begin with the acute and subacute patients unless you are working with a hematologist, oncologist, or an internist who understands the limitations of treating a patient who has been symptomatic for 6 months. I have had some success with treating nonacute patients, for whom I was able to re-establish inline flow, but they may have had a chronic component of thrombus in addition to the acute thrombus. I would not recommend starting out with nonacute patients.

USING THE RIGHT EQUIPMENT

My preferred combination pharmacomechanical device for treating DVT is the Trellis-8. By demonstrating successful outcomes with this device, you will overcome many objections from referring clinicians. Trellis has built-in distal protection, so the risk of pulmonary embolism is very low, the thrombolytic dose remains largely localized, and the overall dose is very small. Most importantly, you can do this in a single setting while evaluating the pelvis and treating any stenosis with a stent, if necessary. The benefits of single-setting treatment are significant. The economics are certainly



Figure 1. The Trellis-8 dual occlusion balloons are inflated to isolate a treatment zone. A low dose of drug is then infused and mechanically dispersed (A). After treatment, particles and drug may be aspirated through the aspiration window (B).

favorable versus a multiday infusion in the ICU, and patient satisfaction is also higher. A single-setting treatment should also make this more acceptable to the referring physicians who are always thinking about the risk/benefit to the patient and may have perceptual fears regarding the dangers of extended thrombolysis infusions. The emergence of single-setting treatment will open the door to market growth and the provision of these therapies to more patients.

You will relieve these patients' symptoms, often within a day, restore pain-free mobility to them, and allow them to be discharged quickly. Improvements in your patients' symptoms will often have the greatest influence on the growth of your DVT practice.

SUMMARY

If you can identify your referral base and effectively educate them regarding the benefits of early intervention with isolated thrombolysis, you will provide DVT patients with a great service in a short period of time. That will benefit the patient, the referring clinician, and the hospital, and will ensure the continued growth of your DVT practice.

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STRATEGIES FOR INITIATING A DVT PRACTICE

By Frank R. Arko, MD

I began performing DVT thrombolysis with one of the early versions of the Trellis device back in 2001 while I was at Stanford University. Currently, there are five physicians in our group at Southwestern Medical Center in Dallas, and I perform all of the endovascular DVT interventions. Initiating my DVT practice development did not require a significant effort, and my volume continues to grow as I now intervene upon approximately one DVT patient per week. These are some of my key lessons about how to approach developing your DVT practice.

IDENTIFY THE REFERRAL BASE

The referral base for our practice has been the vascular lab, hospitalists, hematology/oncology, orthopedic surgeons, urologists, and occasionally neurosurgeons and general surgeons. Primarily, I have received the majority of my referrals through the vascular lab and from hospitalists and other surgeons.

The Vascular Lab

In order to confirm a DVT diagnosis, most physicians will need to send their patients to the vascular lab for an ultrasound. If you operate the vascular lab or develop a relationship with this group, the interaction with the patient and referring physician will provide you with an invaluable opportunity to identify those patients who will best respond to isolated thrombolysis and discuss with the referring physician the benefits of early intervention with new technology. We operate vascular labs in four different hospitals, so when we get DVT patients sent to us for an ultrasound, we call the referring physicians with the results and indicate that we have treatment options to offer their patients that they may not have considered. We generally offer to see the patients for a consultation, or to call the patients to explain the treatment options. We explain to the patients the benefits of isolated thrombolysis: single setting, small dosage of thrombolytic drugs, and low risk of bleeding complications. Most of these patients have significant symptoms, so they are willing to attempt the treatment.

The Emergency Department

I discovered an effective means of increasing referral rates when I was previously engaged in DVT clinical studies. I spent some time visiting the ED and handed out brochures about what we could do to treat DVT patients, and asked the ED personnel to give the brochures to the patients. The patients then contacted me and I discussed with them the details of the study and the new technology to determine if they wanted to participate.

EDUCATE THE REFERRAL BASE

My clinical experience gave me the confidence to talk with the referring physicians in the absence of a profound literature base. Our message to the referring physicians is that we try to treat patients acutely, in a single setting where seek to remove the clot, restore vessel patency, and decrease the long-term morbidity from the PTS.

Referring physicians often send us their chronic DVT patients. To better manage expectations of clinical outcomes, I let them know the increased difficulty for success with these patients, and that many times the best course of action is a graded compression stocking. If the clot is located in the iliac vein of chronic patients, we can sometimes get through these occlusions, stent them, and pro-

(Courtesy of Gerard O'Sullivan, FRCR MRCP Dip ABR (CAQ CVIR) Consultant Radiologist, Section of Radiology, University College Hospital, Galway, Ireland)



Figure 2. Swollen left leg 6 weeks after initiation of anticoagulation (A). Three months after Trellis isolated thrombolysis, PTA, and stent placement (B).

vide significant relief. If, however, the chronic DVT is located in the femoropopliteal segment, there is not much we can do. This message needs to be constantly repeated to help convey the importance of early intervention.

PATIENT SELECTION

Begin With Proximal DVT

Most physicians will refer patients who have thrombus in their iliofemoral system; these patients usually present with a very swollen leg, and the need for intervention is obvious. It is more difficult to get the primary care physicians to refer patients with femoropopliteal DVT, because they are fairly pleased with the results of anticoagulants. In my practice, we often start by treating patients with iliofemoral thrombosis. After impressing both the patients and the referring physicians with the results, we were able to slowly convince the primary care physicians to send us those patients with more distal occlusions and less-advanced stages of thrombosis after diagnosis.

Treating Upper-Extremity DVT

Physicians are more likely to refer patients with upper-extremity DVT because the patients tend to be younger, with a very swollen arm, and often have thoracic outlet syndrome. If primary physicians refer these patients to you, and you successfully remove the thrombus, their swelling subsides almost immediately, offering the patient tremendous relief. After successfully treating these clots, contact the referring physicians to report on the outcome and advise them that similar safe and effective outcomes can be obtained in treating lower-extremity DVT. This will lead to increased referrals and will help build a successful practice treating both extremities.

Focus on Younger Patients

There are approximately 500,000 to 800,000 DVTs annually. Between 30% and 50% of these patients will go on to

develop PTS. Those patients who do not recanalize suffer an even higher risk. I advise my referral base that with young patients who develop DVT, we have our best chance to remove the thrombus and decrease the risk of developing PTS. If we can do that, the patients' lives are going to be better in the long term. If you can convince primary physicians of this, they usually will refer their younger DVT patients to you.

Starting With Nonacute DVT

Although treating acute DVT is the optimal situation, sometimes you have to start your practice by treating the nonacute DVT patients. If you can have a positive impact on suboptimal patients, you can begin to convince the referring physicians that you can make a substantial difference with earlier intervention. After treating the subacute DVT patients, contact the referring physicians and let them know that if you had been able to treat these patients earlier, removing the clot would have been much easier and the patients would not have suffered for as long prior to their endovascular interventions. My experience is that as you have success with nonacute cases, patients will speak with physicians about their successful outcomes, and then your patient flow will improve and will eventually evolve to more acute and easier-to-treat patients.

Do Not Discount the Importance of Symptom Relief

While building your DVT practice, do not ignore the importance of relieving the symptoms of patients, especially those who do not present with the classic objective signs of DVT. These patients often have subjective symptoms (the leg feels heavy or tired, or they cannot walk far) with little or no objective findings to correlate to the complaints (the pulse is still good although the affected leg may be slightly swollen compared to the other leg). I was initially reluctant to treat these patients through intervention, but when I started treating them via isolated thrombolysis, they would come back and say, "My leg feels great, it's not heavy, it's not swollen, I can run, I can exercise, I can jog." These patients are often thrilled with their results, and are very gratified by their treatment.

USING THE RIGHT EQUIPMENT

The Trellis-8 has allowed me to build my DVT practice. There are many benefits to this device, but the biggest benefit has been the single-setting treatment. I no longer have to put the patients into the ICU or infuse them with a lytic drip, so the risks of bleeding and complications are both markedly lower. Patients often come to us after being treated by the primary-care physicians who diagnosed their DVT, placed them on anticoagulation, and 4 to 5 days later, referred them to us. Because these patients are already completely anticoagulated, we can often treat them and send

them home the same day. This is important to the patients, the referring physicians, and our practice.

OUTREACH TO REFERRING PHYSICIANS

You need to be relatively aggressive to get the patients—you need to get out there and talk to the referring physicians. It is also helpful if you can develop a lecture to give at grand rounds in your hospital to the internists and surgeons. During your discussions, show the physicians the device and how it works. Present any cases you have, because a clinical picture is worth a thousand words.

After I treat a patient, I call up the referring physician to let him know the procedure I elected to use, as well as the outcome of the treatment. When he hears that the clot has been removed and the patient has already been discharged, he understands that isolated thrombolysis truly is a single-setting procedure performed in a short amount of time; and, he is encouraged to refer more patients.

ADDRESSING THE NEED FOR DVT TREATMENT

By Charles S. Thompson, MD

Our vascular surgery group became involved in the endovascular treatment of DVT because we were increasingly receiving referrals of complex venous problems. These referrals included patients with large iliofemoral DVT, post-operative complications, limb-threatening ischemia, as well as oncology patients with DVT and patients who were having problems due to dialysis catheter thrombosis or central venous thrombosis. We were one of the few groups in the area willing to operate on massive iliofemoral thromboses, and we began regularly employing thrombolysis because we saw better results with this modality compared to surgery.

The development of thrombolysis and mechanical thrombectomy changed the way we were able to treat DVT and improved our patient outcomes. The introduction of Trellis-8, which uses isolated thrombolysis, provided an even better platform for the treatment of DVT. Once our referral base became aware that we had a safe, quick, single-setting intervention that removed clots, the number of referrals we received increased dramatically.

The development of a successful DVT practice can naturally lead to referrals for other venous disorders. Patients with DVT tend to have other incidences of venous disease, such as complex central venous issues, venous access problems, or May-Thurner syndrome. By demonstrating our ability to treat DVT, we were able to grow our practice to treat these other venous disorders, and thus build a successful venous practice.

IDENTIFYING YOUR REFERRAL BASE

Prior to isolated thrombolysis, we had an informal referral network within the hospital where we were recognized for our surgical DVT work. As we began to treat these patients,

TABLE B: LEVERAGING PERSONAL EXPERIENCE TO DEVELOP YOUR PRACTICE

- Use the vascular lab to identify patients with treatable DVT.
- Focus on treating patients with acute DVT. Be willing to treat nonacute cases in order to jumpstart your practice.
- By treating more proximal clots, you can expect excellent symptomatic improvement. Your patients' satisfaction will encourage your referring physicians to refer more distal clots.
- Network among your colleagues and discuss the benefits of isolated thrombolysis.

our practice grew by word of mouth. Once we became known as the "venous practice," our volume grew further because primary-care practitioners in the community usually refer according to an organ system. We therefore did not need to engage in much "marketing" of our DVT practice such as hosting presentations for other physicians. Our efforts consisted of talking with the referring physicians, the hospitalists, and the ED doctors to let them know that there were excellent alternatives to treating the patients solely with anticoagulation. As a result, our patients come from a wide section of the overall hospital population. Moreover, up to 75% of the patients we see who need treatment are already in the hospital or are being admitted via the emergency room.

Our first referrals came to us as a result of failed medical therapy attempts, often coming from an oncologist or hematologist frustrated with a patient's unresponsiveness to several days of anticoagulation. When these physicians saw how successful we were using isolated thrombolysis, they realized that this was a viable adjunct to medical therapy, and their acceptance of this treatment gradually increased. Additionally, many of our oncology patients develop DVT in what may be in the last years of their lives, but they are in intense pain and are unable to walk. We would be reluctant to do a venous thrombectomy or thrombolysis on any patient who has metastatic disease or a proclivity for bleeding. But those concerns are minimized with isolated thrombolysis, and we have seen dramatic improvements in their symptoms, such as pain and ambulatory ability.

EDUCATING THE REFERRAL BASE

The real challenge to anyone seeking to build a DVT practice is to convince referring physicians that not every DVT patient should be treated solely by anticoagulation. There is a tendency among referring physicians to treat all DVT patients with anticoagulation to the exclusion of other therapies that might achieve better results. Young patients who are fit but diagnosed with iliofemoral or femoropopliteal DVT, as well as symptomatic patients, should be strongly considered for isolated thrombolysis.

There are several rationales for performing an endovascu-

PERSPECTIVE OF A REFERRING PHYSICIAN

By Michael R. Jaff, DO

An interventionist seeking referrals from primary physicians will need to educate the referral base that there is an interventional option. There has been a long-standing belief among referring physicians that the only effective treatment for DVT is heparin. These physicians need to be shown that there may be another option. The previous standard for interventional care has been catheter-directed thrombolysis, delivering high doses of lytic over a long period of time, sometimes upward of 60 hours, to resolve the thrombus. The length of hospital stay, the bleeding risk associated with a long-term lytic infusion compared to that of low-molecular-weight heparin, and the lack of scientific data showing preservation of the valvular function,

have all presented several major obstacles for interventional referrals.

CHANGING MINDS

As a referring physician, here is what would cause me to increase my interventional referrals: (1) the availability of a thrombectomy device or some other endovascular method to debulk most of the clot in a short procedural time period (1 to 2 hours) that would allow the patient to be out of the hospital in 2 days instead of 6 days; (2) a shorter duration of lytic infusion, which would reduce the bleeding risk; and (3) long-term data. Having said that, there are some nearer-term device studies in development that may provide the referring physicians with basic safety and efficacy data of a device intervention. These data may be sufficient to alter the paradigm of

therapy for the most symptomatic of patients.

POSTPROCEDURE

If you obtain a successful result (quick intervention, clot debulking, home in day or two), you should be certain to contact the referring physician and advise them of the result and let them know to continue the anticoagulants and follow-up with ultrasound. Ask them to keep this therapy in mind as an option when they have otherwise relatively healthy patients with significant DVT.

Dr. Jaff's vascular ultrasound core laboratory, owned by the Massachusetts General Hospital, receives research funds from Bacchus Vascular in return for performing image interpretation as part of FDA-approved trials.

lar DVT intervention. One is that it is an effective treatment for immediate symptomatic relief for the patient. Also, if you are able to recanalize the vein, you are less likely to have venous incompetence. And, as vascular surgeons, we see patients with venous incompetence who have PTS from chronic DVT, and we end up treating these patients for weeks, months, and years down the road. When we showed the referring physicians how successful we were with isolated thrombolysis, they then realized it was an adjunct to medical therapy, and that there were times when treating a patient with thrombolysis was preferable to treating a patient only with anticoagulation.

THE RIGHT EQUIPMENT

The advantage of the Trellis device is that at the time the diagnostic imaging is performed, you can place the catheter, treat the patient and, within approximately 35 to 45 minutes on average, you can achieve a near-complete or complete resolution of the clot, remove the device, and send the patient back to the floor—without thrombolytics—and not have to keep that patient in a monitored bed for 2 or 3 days. This also reduces the risk of long exposure to thrombolytics, with which complications are related not only to dose, but also to the time of exposure. The patients are ambulating much more quickly and medical staff and the cath lab are made more available.

CONCLUSION

Within this disease state, there is a group of undertreated patients with symptomatic, massive DVT. Often, the reason for this undertreatment is that the treating physicians are simply unaware of the options for these patients. We are a good example of a local group who took an interest in DVT, adopted new and more effective treatment tools, and became leaders in our local market, almost inadvertently, because no one else was focused on treating DVT in our region. Given the relative lack of endovascular procedural volume for venous disease, this may also be a potential opportunity in other markets. ■

KEY CONSENSUS POINTS

- Practices can be developed with simple initiatives.
- Use 1:1 contact with referring physicians to increase awareness of options and your willingness to treat DVT.
- Leverage relationships with ED staff and ultrasound lab.
- Acute thrombosis patients are the ideal candidates for treatment.
- There is a captive market of DVT patients within the hospital population, simplifying the outreach process to physicians.
- There is an unmet clinical need in most communities for more effective DVT treatment that interventionists can capitalize on.