

HIGHLIGHTS

Brevity, Clarity and Wit: 10 Commandments for a 10-Minute Talk

Morton J. Kern, MD

page 6

The Writing Is on the Wall. Have You Read What's Coming?

Current Headwinds Facing Hospitals

Gary Clifton talks with Ryan Graver, Terumo Business Edge

page 10

Left Ventricular Rapid Pacing in Balloon Aortic Valvuloplasty (BAV): The Novel Refinement of an Old Technique

Keith Andrew L. Chan, MD, Francisco L. Chio Jr, MD, FACC, FACP, FSCAI

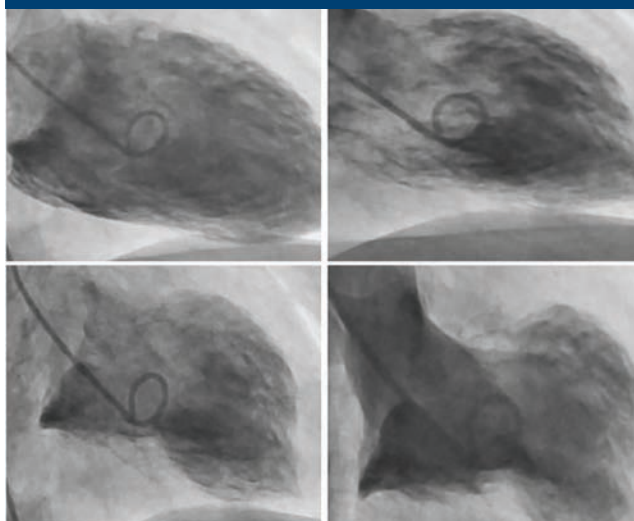
page 24

Focus on Results: A Culture of High-Performance Ownership

Doug Langager, RCIS

page 26

Case Report



Anterior ST Elevation Myocardial Infarction: A Presentation of Focal Takotsubo Cardiomyopathy

Zeid Nesheiwat, DO, Muhammad Asif Mangi, MD, Arooge Towheed, MD, Mubbasher Ameer Syed, MD, Mujeeb Sheikh, MD

Abstract

Takotsubo cardiomyopathy (TCM) is a transient, non-obstructive dysfunction of the heart. Focal TCM is a rare variant where the dysfunctional wall segment is within one coronary artery distribution. Reported to occur in less than 1.5% of cases, the majority of incidences involve the anterolateral wall segment, which is consistent with left main coronary artery distribution. Here, we share the case of a 78-year-old female who presented with acute ST-segment myocardial infarction and who was found to have focal TCM involving the mid anterior, apical anterior, and inferioapical wall segments, consistent with left anterior descending artery distribution. This case is very rare and represents a variant of focal TCM that is isolated to the anterior wall, involving the left anterior descending artery distribution.

continued on page 22

TRAINING

Simulation is Important for Interventional Training

It Needs Our Attention and Funding

Cath Lab Digest talks with Kwan S. Lee, MD, Associate Professor of Medicine at the Sarver Heart Center, University of Arizona, Tucson, Arizona.



Why should we consider the use of simulation in interventional procedural training?

We need to embrace simulation as an initial training step for new fellows. There must be a better way than the current model of "see one, do one, teach one", especially in the very early phase of training. We owe it to our patients to not have to

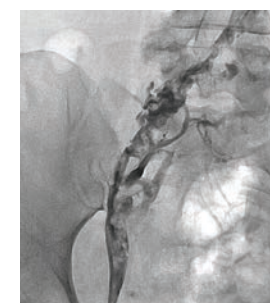
expose them to the steep learning curves most fellows have to go through in the beginning prior to becoming reasonably proficient, or to the challenge of more experienced operators learning how to deal with rare but important situations such as complications. There has been no other way to do it until recently. It is time to make an argument for simulation.¹

continued on page 12

NEW DEVICES

A New Kid in Town: Single-Session Treatment for Iliofemoral DVT Without Thrombolytics

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Iliofemoral deep venous thrombosis (DVT) causes venous outflow obstruction associated with severe symptoms of pain and swelling. These patients have a significantly increased risk for post-thrombotic syndrome and 2.4-fold increased risk of recurrent venous thromboembolism events.¹ Venous symptoms cause major distress for patients and have a severe negative impact on quality of life.²

The treatment options currently available for DVT include: endovascular thrombolytic therapy, mechanical thrombectomy, pharmacomechanical thrombectomy, and surgical thrombectomy. Thrombolytic therapy carries a substantial risk for adverse

bleeding events and has shown no long-term benefit over anticoagulation alone.³ Mechanical thrombectomy has substantially lower complications and bleeding rates; however, optimal outcomes and thrombus burden reduction remain unimpressive with current technologies, especially with smaller devices and the chronic nature of the clot burden.

We describe our first experience with a new percutaneous mechanical thrombectomy device for the treatment of iliofemoral DVT called ClotTriever (Inari Medical) (Figure 1), which offers significant thrombus burden reduction in a single setting without thrombolytic exposure.

continued on page 20

Continued from cover

A New Kid in Town: Single-Session Treatment for Iliofemoral DVT Without Thrombolytics

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Case Report

A 61-year-old female with a recent history of left knee arthroscopy developed significant pain and swelling in the left lower extremity 2 days after the procedure. A Doppler venous ultrasound study was performed that demonstrated DVT extending from the femoral vein to the external iliac vein in the left lower extremity. The patient was started on anticoagulation with enoxaparin and coumadin. She continued to have severe swelling and pain despite anticoagulant therapy. She was subsequently referred to our facility for a venogram and possible intervention.

The patient was brought to the cardiac catheterization lab and placed prone on the table. Ultrasound-guided access was obtained and an 8 French (Fr) sheath was placed in the left popliteal vein. Initial venography revealed complete occlusion of the left mid femoral vein extending to the common femoral, external iliac and up to the confluence of the common iliac veins, with large collateral formation at the common femoral vein (Figures 2-3).

A diagnostic 5 Fr multipurpose catheter and an .035-inch Glidewire Advantage (Terumo) wire were used to cross the occluded vessel into the inferior vena cava. The wire was subsequently parked in the left subclavian vein. The sheath was exchanged for the 13 Fr ClotTrievers Sheath in the popliteal and the self-expanding nitinol funnel was deployed (Figure 4). The ClotTrievers catheter was advanced up into the inferior vena cava, and the catheter was unsheathed to deploy the collection bag and coring element (Figure 5). The coring element is designed to core and collect thrombus into the connected collection bag as it is being pulled through the vessel. The catheter was then slowly pulled back through the iliac and femoral veins, into the sheath, and removed. The sheath was aspirated to pull out captured thrombus from the pullback of the device and the collection bag was cleaned out. A total of four runs were made, directing the catheter to the 3, 6, 9, and 12 o'clock positions. While

pulling the device through the left common iliac, a point of compression was noted suggestive of May-Thurner syndrome, also known as iliac vein compression syndrome (Figure 6).

Final venography revealed almost complete resolution of thrombus in the

external and common iliac and femoral veins (Figure 7). The sheath was removed and hemostasis was achieved with manual pressure. The patient experienced significant relief of pain and swelling immediately after the procedure and was discharged from the hospital the next day on oral anticoagulation therapy.

Follow-up

Upon follow-up, the patient continued to complain of pain and swelling in the left lower extremity. Venous Doppler ultrasound demonstrated complete resolution of thrombus and maintained compressibility. She was maintained on anticoagulation and brought back for intravascular ultrasound (IVUS) and possible stenting. IVUS evaluation demonstrated complete resolution of thrombus in the femoral and iliac veins, but a

The current treatment options for DVT come with major limitations.

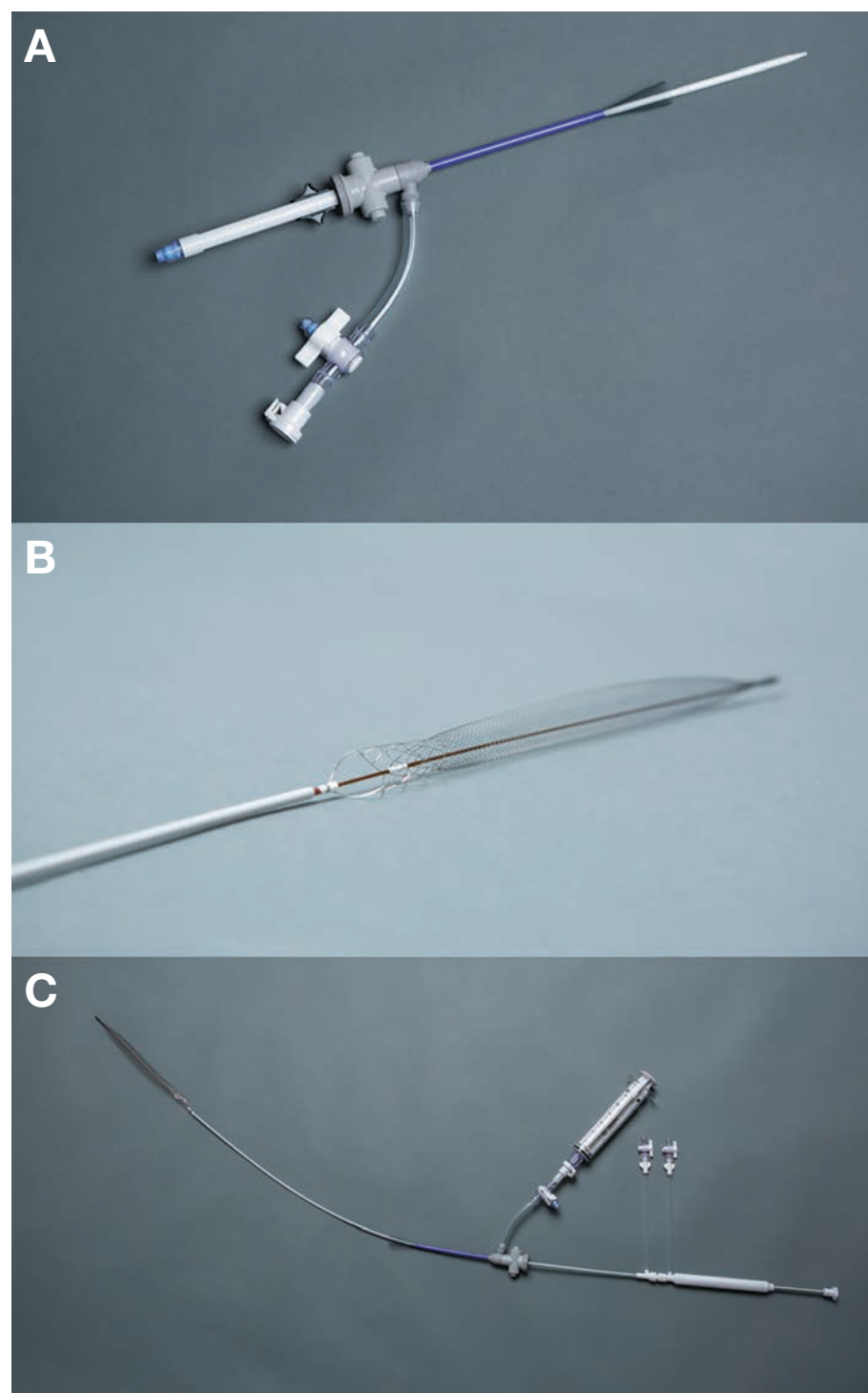


Figure 1. A) The ClotTrievers sheath with self-expanding mesh nitinol funnel and aspiration stopcock. B) The ClotTrievers catheter with proximal nitinol coring element and braided collection bag. C) Full ClotTrievers system with catheter and sheath. Courtesy Inari Medical.

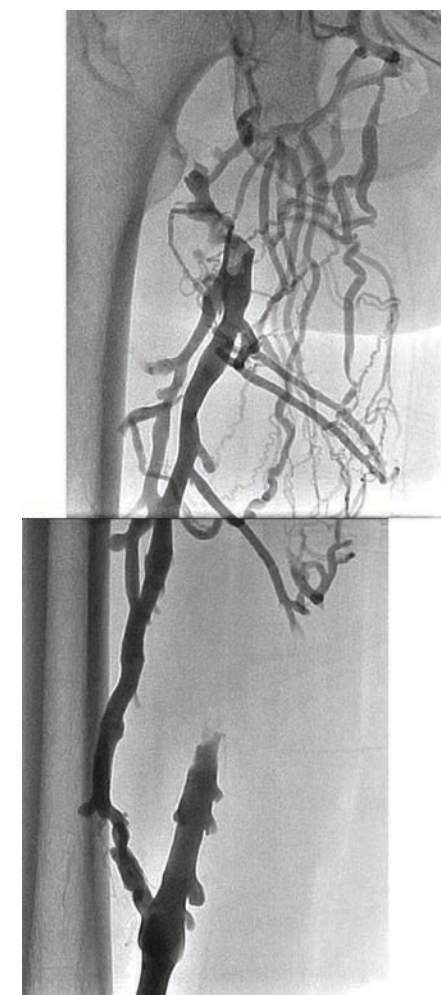


Figure 2. Venogram of complete occlusion of the left mid femoral vein extending to the common femoral vein with large collateral formation.

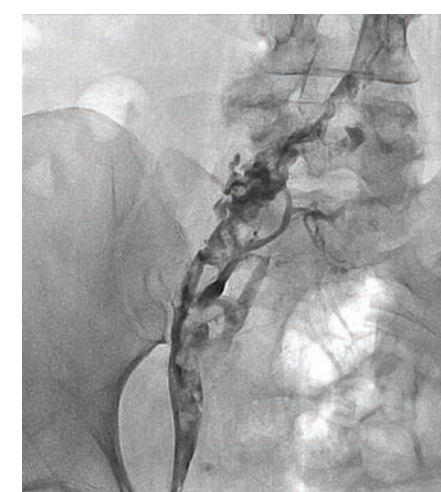


Figure 3. Venogram of thrombotic occlusion of the left external and common iliac vein.

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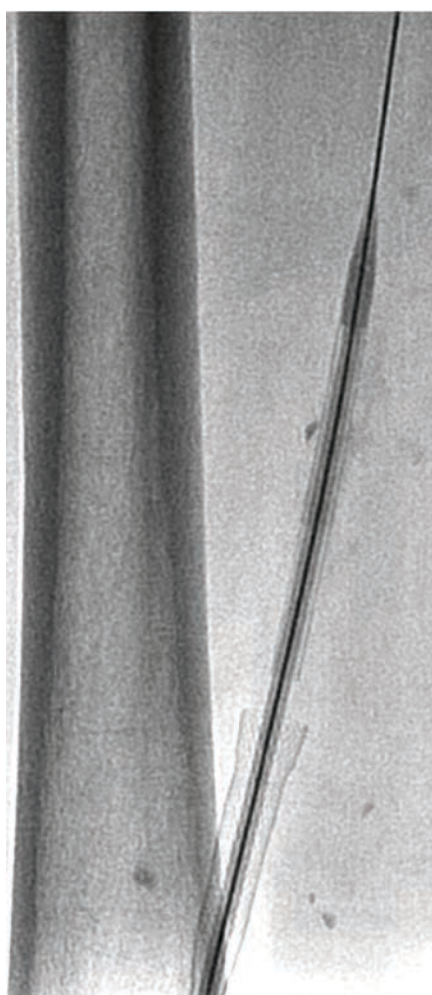


Figure 4. The ClotTriever sheath with deployed nitinol funnel.

93% compression was noted in the left common iliac vein. Subsequently, two venous stents were placed, and the patient was discharged home the same day. She continues to be symptom free and returned to her normal quality of life prior to her event.

Discussion

The ideal treatment for large DVT would be percutaneous mechanical thrombectomy with complete resolution of thrombus burden in a single session without using thrombolytic therapy and exposing patients to increased risk of bleeding.

The current treatment options for DVT come with major limitations. First, the data from the ATTRACT trial did not show a significant difference in post-thrombotic syndrome between the intervention and nonintervention groups, but it did show a difference in both acute relief of symptoms and severity of post thrombotic syndrome, both of which are meaningful.³ Notably, most patients treated in the study did not have complete clot resolution, which could be a potential factor in improving long-term outcomes. The patients treated with thrombolytic therapy in the trial had higher bleeding complications due to longer thrombolytic infusion times.

Second, as the thrombus ages past the first 1 to 2 weeks, it becomes more difficult to completely clear the entire venous lumen in large 12- to 18-mm proximal veins. We find that in older thrombus, although a flow pathway

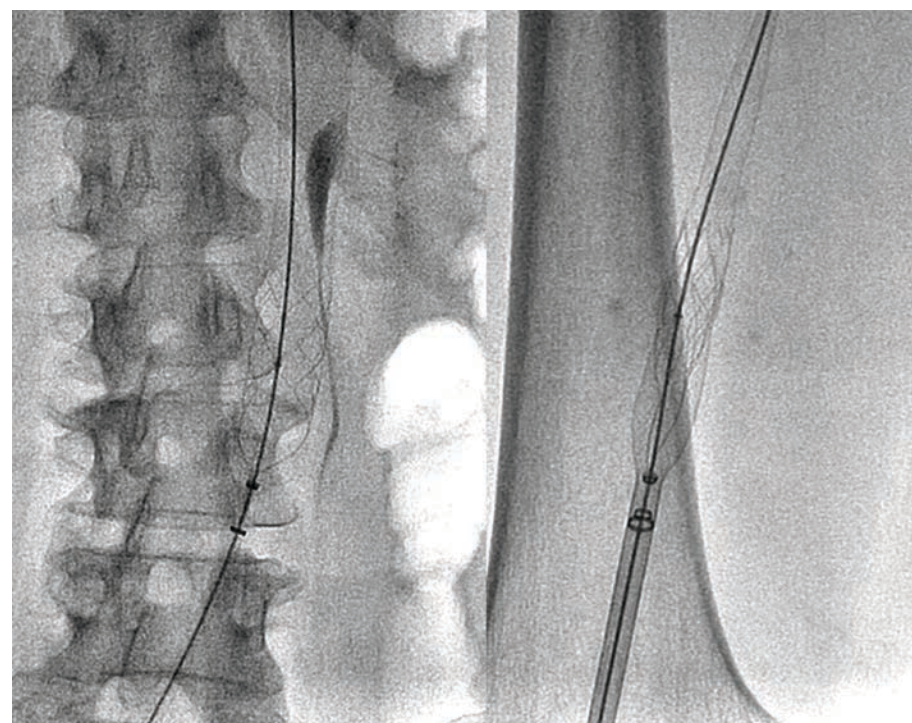


Figure 5. ClotTriever deployed in the inferior vena cava and advanced down through the sheath in the popliteal vein.

The catheter is technically simple to use and the learning curve is short. Our procedure time was 45 minutes.

can be reestablished, smaller mechanical thrombectomy devices leave a small outflow channel that is not adequate to supply sufficient venous drainage. When thrombus is older than 3 to 4 weeks, often these methods are completely ineffective. We think there is a significant advantage for the use of the ClotTriever catheter, which has the ability to extract older thrombus and achieve a larger flow lumen in these cases.

Third, postoperative DVT patients or patients with recent bleeding complications are often not offered the option of thrombolytic therapy. In these cases, mechanical thrombectomy alone is chosen, and in some instances, suboptimal results are achieved due to small French devices and large thrombus burden. In our case, this patient had a recent arthroscopic knee surgery, and we used the ClotTriever device to fully clear the thrombus burden and reestablish venous outflow without the use of tPA.

Finally, DVT treatment has been associated with high costs. The use of thrombolytics increases the treatment cost and requires the patient to stay in the intensive care unit. Long infusion times and inadequate thrombus resolution can prolong the patient's stay in the hospital and require multiple interventional procedures. Being able to treat patients in a single session without the need for thrombolytic drugs or an intensive care stay is an appealing option for healthcare systems.

This case demonstrated complete removal of thrombus with the mechanical

thrombectomy device ClotTriever in a single session without exposing patients to the hazards of thrombolytic therapy. The catheter is technically simple to use and the learning curve is short. Our procedure time was 45 minutes. ClotTriever uses a 13 French sheath for the extraction of thrombus, which can be considered daunting. However, as it placed in the venous system, major vascular complications are far less likely than in the arterial system. We think this would be an excellent tool to add to the armamentarium for DVT treatment, with advantages over current thrombolytic therapies and thrombectomy devices. Large-scale studies are eagerly anticipated to determine short- and long-term outcomes of this treatment for patients with acute and chronic DVTs. ■

References

1. Douketis JD, Crowther MA, Foster GA, Ginsberg JS. Does the location of thrombosis determine the risk of disease recurrence in patients with proximal deep vein thrombosis? *Am J Med.* 2001 May;110(7):515-519.
2. Kahn SR, Shbaklo H, Lamping DL, Holcroft CA, Shrier I, Miron MJ, et al. Determinants of health-related quality of life during the 2 years following deep vein thrombosis. *J Thromb Haemost.* 2008 Jul;6(7):1105-1112.
3. Vedantham S, Goldhaber SZ, Julian JA, Kahn SR, Jaff MR, Cohen DJ, et al. Pharmacomechanical catheter-directed thrombolysis for deep-vein thrombosis. *N Engl J Med.* 2017 Dec 7;377(23):2240-2252.

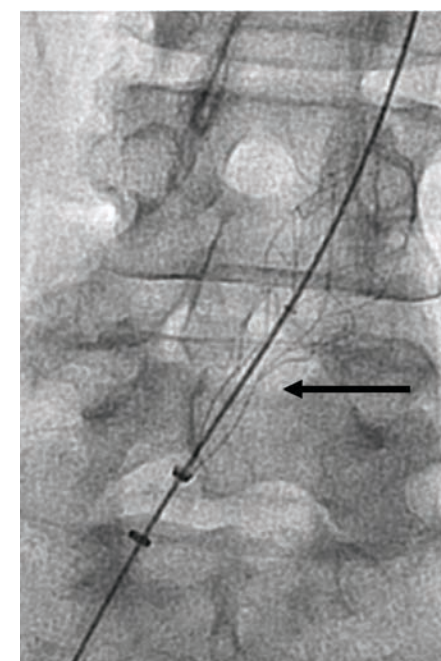


Figure 6. Device compression while passing through the left common iliac vein.

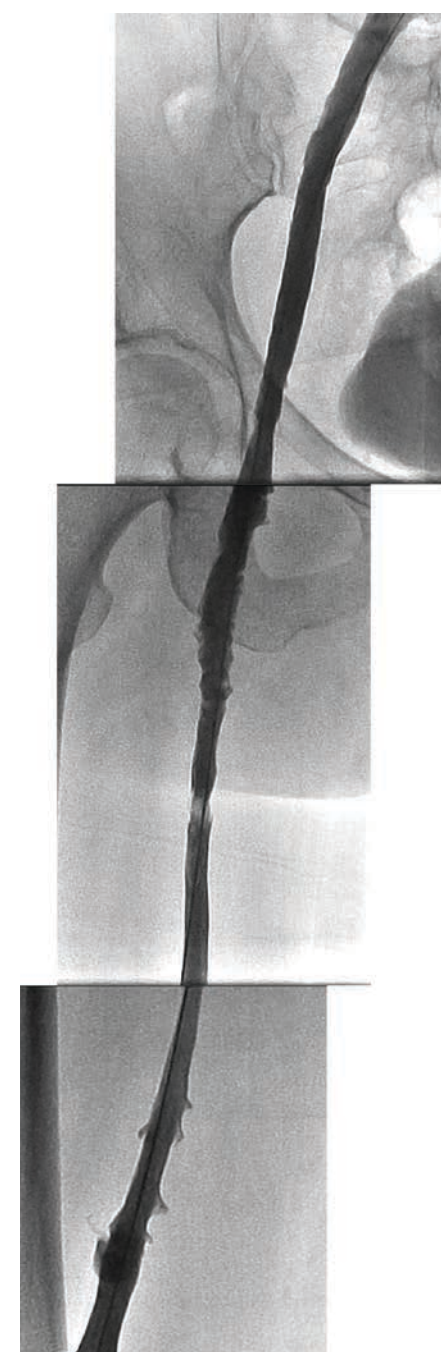


Figure 7. Final venography after treatment with ClotTriever revealed almost complete resolution of thrombus in the external and common iliac and femoral veins.