

# One, Two, Three: Stepwise Treatment of a Large DVT in a 53 Year Old Female with May-Thurner

Michael H Makki\*

Interventional Cardiologist, University of Arizona College of Medicine, USA

\*Corresponding author: Michael H Makki, Interventional Cardiologist, Assistant Clinical Professor, St Lukes Medical Center, University of Arizona College of Medicine, Phoenix, AZ 85006, USA, Tel: 602-234-0004; Fax: 602-253-6665; E-mail: [drhmakki@gmail.com](mailto:drhmakki@gmail.com)

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## Case Report

In 1908, McMurrich described the presence of strictures in the common iliac vein that were believed to be responsible for the increased incidence of left leg deep-vein thrombosis (DVT). This syndrome would eventually become known as iliac vein compression syndrome or May-Thurner Syndrome (MTS). Left iliac vein compression from the contralateral right common iliac artery, against the posterior fifth lumbar vertebral body, is estimated to comprise 49% to 62% of cases of left lower extremity disease.

Although the incidence of Deep Vein Thrombosis (DVT) related to MTS is low at 2-3%, patients can often present with leg pain and swelling that has been going on for years. Younger women, ages 20-40, appear to be the most likely to present with acute DVT. Thrombophilia or a propensity to form clots is present in two thirds of patients presenting with blood clots in the legs.

By far, the most dangerous sequela of DVT is Pulmonary Embolism (PE) with the incidence in general population having doubled since the late nineties with the increased use of CT scanning to diagnose it. In the US, PE accounts for approximately 100,000 annual deaths with up to one-third being from sudden fatal PE. Overall, however, deaths from PE have been declining over a 20 year with a reported a 30-day and 1 year mortality at 4 and 13 percent, respectively.

Perhaps the most important long term consequence of DVT is Post-Thrombotic Syndrome (PTS). The reported incidence of PTS varies widely, in part due to inhomogeneous patient populations and diagnostic criteria, but the incidence of approximately 50 percent in the first year in spite of anticoagulation has been reported. Severe post-thrombotic syndrome occurs in up to 10 percent of patients and can manifest as severe skin changes, chronic and debilitating pain and swelling, skin pigmentation and venous ulcers [1-5].

## Case Clinical History

A 53-year-old female presented our Phoenix hospital from the airport with dyspnea and left leg swelling during her layover from Indiana to Texas. CT scan was done and confirmed the presence of a right lower lobe pulmonary embolism. An ultrasound of her left lower extremity demonstrated a large DVT extending from her common femoral vein through her popliteal and continuing through her anterior tibial vein. She was started on unfractionated heparin and an echocardiogram was done within thirty minutes of her arrival. The echocardiogram did not show any right ventricular enlargement or strain with preserved left ventricular function. She was hemodynamically stable.

Within 2 hours of her arrival she was taken to the Cath Lab and an IVC filter was placed through the right femoral vein through a 7 French sheath. Heparin was continued overnight and the patient remained hemodynamically stable.

The following day she returned to the Cath Lab where after unsuccessful ultrasound-guided tibial vein access was attempted, the patient was placed prone for a popliteal approach. Utilizing ultrasound and a micro puncture kit the thrombosed popliteal vein was cannulated and a 5 French sheath was initially put in place. An angled quick cross guide catheter with a 0.34 Glidewire were advanced into the common iliac vein system where a venogram confirmed extensive clot formation throughout the common, external iliac and femoral venous system (Figures 1 and 2).

The 5 French sheaths was then exchanged for 6 French Terumo glide sheath which was then used to introduce the EKO-Sonic thrombolytic infusion catheter over a standard 0.34 guidewire into the common iliac vein. The catheter was then positioned the area of greatest thrombus where it was secured in the sheath and then to the patient's skin. TPA infusion was started at 1 mg an hour and infused overnight for total dose of 20 mg. Heparin was continued at half dose with a target PTT of 40-60 seconds.

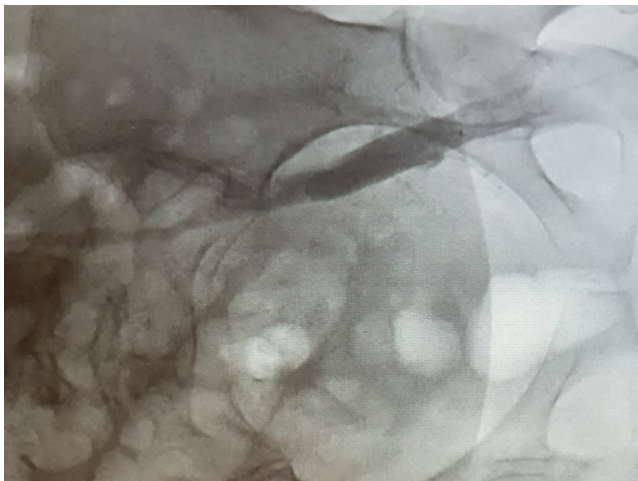


**Figure 1:** Venogram showing extensive DVT with no flow returning to IVC due to the clot burden. Here, the IVC filter is in place.



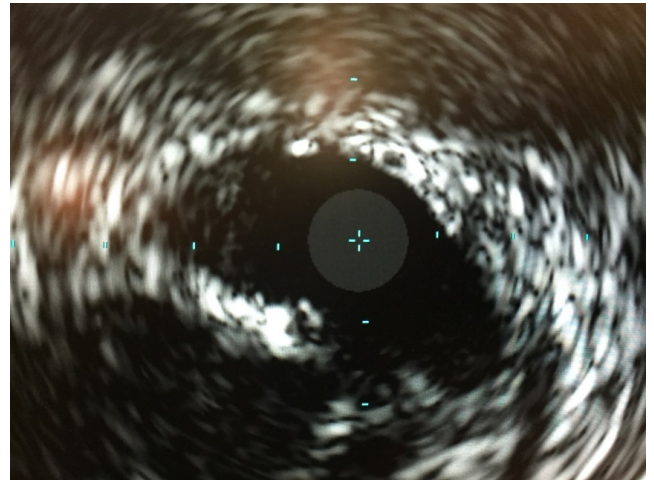
**Figure 2:** Image shows a close up of the lucent caused by the thrombus in the vein.

The following day, the EKOS catheter was removed and an angled Quickcross catheter was advanced to the distal common iliac vein where venograms showed near complete resolution of the DVT. Venograms also demonstrated a high-grade stenosis of the proximal common iliac vein suggesting the presence of May-Thurner Syndrome (MTS) (Figure 3).



**Figure 3:** Image shows resolution of thrombus with very scant flow crossing the midline from common iliac vein to IVC.

The stenosis was crossed with difficulty with a 0.18 Turomo Gold guidewire over which the quick cross catheter was advanced and used to perform a venogram just below the IVC filter confirming presence in the venous luminal space. A 6 French sheath was then upsized to a 10 French sheath and an 0.34 Versicore guidewire was placed in the IVC allowing for IVUS imaging of the May-Thurner stenosis (Figures 4 and 5).



**Figure 4:** IVUS image inside the vein shows the fibrotic character of the stenosis as well as confirming the severity of the stenosis. The echo lucent crescent area in the 9-12 o'clock position is the Right Iliac Artery overlying and obstruction the Left Iliac Vein.

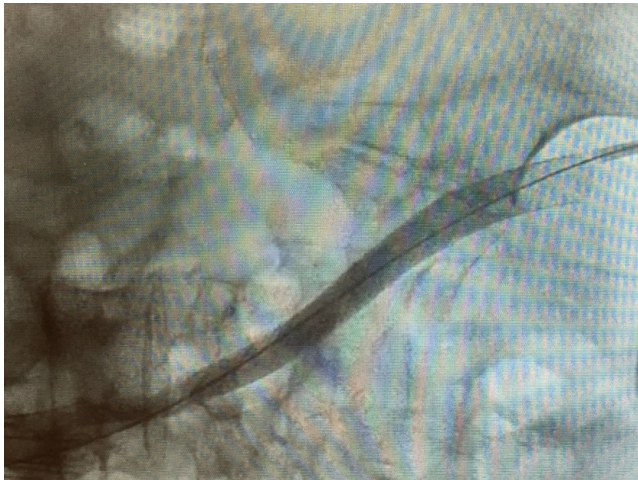


**Figure 5:** Balloon inflation across the May-Thurner stenosis underscores the severity of the stenosis.

IVUS imaging confirmed the presence of MTS and provided the reference diameter of the healthy vein measuring at 16 mm. Sequential balloon angioplasty was done with 9.0 × 60 mm balloon throughout the course of the common iliac vein. Subsequent inflations using a 14 × 40 mm balloon was done to further expand the lumen to facilitate stent placement. We then placed a Boston Scientific WALL stent from the ostium of the left common iliac vein through the area of obstruction extending to healthy vein tissue distally. Post deployment dilatation of the stent was done with an 18 mm × 40 mm balloon.

Final venogram showed brisk flow from the inferior vena cava through the popliteal veins with no further thrombus visualized. Please see Figure 6.





**Figure 6:** Final image showing excellent in line flow from the IVC to the femoral vein.

The patient did well overnight with a continuation of unfractionated heparin. She was discharged the following day on Xarelto 15 mg by mouth twice a day and Plavix 75 mg daily to be taken for 1 month with the plan to continue the oral anticoagulation for 6 months. The patient was also instructed to have the IVC filter removed within the next month at her final destination in Texas [5-9].

## Conclusion

The DVT and pulmonary embolism population represent a significant vulnerable patient population. This patient population requires a prompt evaluation to assess hemodynamic stability, clot burden evaluation and the stepwise approach to treatment. After considering the clinical history, CT scan findings and echo findings suggestive of no right ventricular compromise with a low clot burden in the pulmonary arteries, a stepwise approach to thrombus management was undertaken.

The patient was first protected from further pulmonary embolism with the placement of an IVC filter and prompt anticoagulation with unfractionated heparin. The following day ultrasound guidance helped cannulate a thrombosed popliteal vein on the left side so as to maximize catheter support by proximity to the clot burden. This facilitated placement of the EKO-ultrasonic infusion catheter. TPA infusion was done at 1 mg an hour for a total of 20 mg overnight with excellent, near complete resolution, of the clot in the common iliac vein and external iliac vein. The diagnoses of May-Thurner syndrome, both with venography and IVUS imaging, facilitated balloon angioplasty and stenting of the culprit vessel and should prevent future thrombotic events from that site. Long-term anticoagulation should include Plavix for 1-3 months for the stent deployment and up to 6 months of a novel anticoagulant for the DVT component.

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