Deep vein thrombosis of the left lower limb: Could be a May Thurner Syndrome?

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Learning objectives

The purpose of our educational exhibit is to:

1. Review key anatomical structures, clinical features, diagnostic testing and treatment options in May Thurner Syndrome.
2. Expose radiologist’s role in the management of May Thurner Syndrome: from suspicion to treatment.
3. Review the management of 5 different cases of May Thurner Syndrome diagnosed in our hospital between 2014 to 2018.
Background

Definition

May-Thurner syndrome (MTS), also known as Cockett's syndrome or iliac vein compression syndrome refers to a chronic compression of the left common iliac vein (CIV) imposed by the crossing right common iliac artery against the body of a lumbar vertebra (Fig 1). The resultant chronic venous stagnation produces chronic left lower extremity swelling with or without thrombosis of the left iliac and femoral veins.

History

In 1957 this syndrome was described by May and Thurner. They observed compression of the left common iliac vein between the overriding right common iliac artery and an underlying vertebral body in 22% of 430 autopsies. Ten years later, in 1967, Cockett illustrated relationship between iliac vein compression and post-thrombotic syndrome.

Epidemiology

The incidence and prevalence of MTS are unknown but are likely underestimated given that most individuals with MTS anatomy do not have symptoms and require no treatment. MTS is primarily seen in young people between 18-50 years old, being five times more frequently in women.

Usually there are some reason or risk factors that may predispose individuals with MTS anatomy to blood clot formation like injury, surgery, prolonged immobilization, obesity, inherited or genetic blood clotting disorder, pregnancy, oral contraceptive use, dehydration, cancer or infection.

Clinical features

Many people with MTS anatomy are asymptomatic. The typical symptom is left lower limb swelling, which may be acutely due to left iliofemoral vein thrombosis or chronic due to pelvis venous congestion without underlying thrombosis.

Other chronic symptoms include varicosities and chronic venous stasis ulcers. Extreme cases of lower-extremity DVT may cause serious complications such as pulmonary embolism or critical limb ischemia and possible limb loss because of early compromise of arterial flow secondary to extensive DVT. This last condition is characterized as phlegmasia cerulea dolens and patients present severe pain, swelling, cyanosis and edema of the affected limb.
**Diagnosis.**

A diagnosis of MTS may be suspected by clinical features and initial diagnostic testing.

First study to evaluate lower extremity swelling is a Doppler US to rule out DVT. However, direct ultrasound visualization of the iliac veins is often difficult due to their relatively high location within the pelvis.

A definitive diagnosis of MTS requires demonstration of the venous stenotic lesion in an appropriate anatomic location. Computed tomography (CT) and magnetic resonance imaging (MRI) are the more effective non-invasive tests which can directly visualize compression of the vein by the artery, as well as DVT and collateral vessels often seen in patients with MTS.

Minimally invasive imaging techniques such as conventional venography may be more helpful in identifying left common iliac vein compression than CT and MRI. But venography is most often reserved for cases of suspected MTS in which treatment like angioplasty or stenting are planned.

Another invasive imaging technique, less used for its low availability, is intravascular ultrasound (IVUS). IVUS can verify the May Thurner anatomy giving a lot of information about vascular size and morphology. This technique also has been used to determine the presence and age of DVT, which may determine the type of treatment.

**Treatment.**

Treatment is reserved for patient with symptoms, most commonly with DVT.

Treatment options include heparin therapy and/or thromlytic therapy to clearing the thrombus followed by percutaneous transluminal angioplasty(PTA) with or without stent placement to correct the compression of the vein.

If a stent placement has performed, long-term anticoagulation/antiaggregation and elastic compression stockings are recommended following treatment to maintain venous patency, prevent restenosis of the stent and limit the risk of post-thrombotic syndrome (PTS). PTS may occur in up to one-half of patients with extensive DVT and consists of some combination of leg pain, swelling, redness, or skin changes.
Fig. 1: Fig.1: Drawing illustrates May-Thurner syndrome: compression of the left CIV between the right CIA and the anterior surface of the underlying vertebral body.

Findings and procedure details

We present 5 clinical cases (4 women and 1 men) of MTS diagnosed in our center between 2014 to 2018, with an age range between 14 and 82 years old.

In each case Doppler US, CT and MRI findings are reviewed. In all cases definitive May Thurner diagnosis was reached by CT but in one case MRI was performed first demonstrating thrombosis of the left external iliac vein because the patient was pregnant.

Two of them were treated only with low molecular weight heparin (LMWH), the other three with thrombolytics and in two of these angioplasty and stenting too.

Case Report 1:

A 31 year-old female in the 37th week of gestation with left leg pain and swelling for 24 hours. Doppler US showed signs of deep venous thrombosis of the left iliofemoral-popliteal axis. Heparin infusion was initiated. MRI showed DVT of the left external iliac and common femoral veins (Fig.2). After pregnancy delivery CT images showed a compression of the left common iliac vein by the right common iliac artery with acute thrombus in the left external iliac and common femoral veins. These features were consistent with MTS (Fig. 3). She was discharged on long-term antiaggregation therapy and elastic compression stocking.

Case Report 2:

A 41 year-old male with prothrombin and MTHFR gene mutation. He presented to the emergency department with pain, edema and cold left leg. Doppler US revealed acute DVT extending from the left common iliac vein to popliteal vein.

CT scan showed thrombus extending into the left common iliac, external iliac, and common femoral veins with compression of the left common iliac vein between the right common iliac artery and an underlying vertebral body.

Therapeutic anticoagulation with intravenous heparin infusion was initiated. Since the clot was large, thrombolitics therapy was planned. The left common iliac vein was catheterize through the Seldinger technique from the right femoral vein. A left leg venogram demonstrated thrombus extending into the left common iliac, external iliac, common and superficial femoral veins (Fig.4). The patient was treated firstly with local intravenous Urokinase thrombolysis, then with percutaneous transluminal angioplasty (PTA) and finally with left common iliac vein stenting. The stent was deployed and final check demonstrated an optimal result. He was discharged on long-term oral anticoagulation therapy (Fig 5,6).
**Case Report 3:**

A 82 year-old female with medical history of diabetes, high levels of cholesterol and left-sided heart failure was transferred to our facility with signs and symptoms of phlegmasia cerulea dolens in the lower left limb. Venous doppler US of the lower limb revealed acute DVT extending from the left internal iliac vein to popliteal vein. Therapeutic anticoagulation with intravenous heparin infusion was initiated.

CT images showed left common iliac vein compression between the left common iliac artery and a underlying vertebral body. This compression produced a thrombosis of the left iliofemoral-popliteal axis. In this case the left common iliac artery is elongated (Fig 7, 8).

The patient was treated successfully with low molecular weight heparin (LMWH) during 6 months. After that LMWH was replaced by long-term oral anticoagulation.

**Case Report 4:**

A 14 years old female, with some thrombotic risk factors (factor V Leiden, factor VII deficiency, and homocystinuria with hyperhomocysteinemia), presented to the emergency department with worsening left leg pain and swelling for two days. Doppler US of the lower extremities revealed an acute DVT of the left external iliac, common and superficial femoral veins. Heparin infusion was initiated. Since the clot was large and recent, thrombolytic therapy was planned. A left leg venogram demonstrated thrombus extending into the inferior vena cava, left common iliac, external iliac, common and superficial femoral veins. A dose of Urokinase was infuse into the thrombus during three days. Repeat ascending venogram obtained 24 hours after Urokinase infusion showed significant clot dissolution throughout the occluded segments.

CT scan of the pelvis confirmed the diagnosis of MTS showing a compression of the left common iliac vein between the right common iliac artery and the 4th lumbar vertebra, and this images also showed increased of collateral circulation around the left kidney and around the uterus (Fig. 9).

She was discharged with elastic compression stocking and LMWH during 9 months. After this time she continues with long-term oral anticoagulation therapy.

**Case Report 5:**

A 30 year-old female taking oral contraceptive (birth control) pills with 15 days of increasing left leg swelling and pain suspicious for DVT. Doppler US examination demonstrated a blood clot within the left common femoral vein extending to the left external iliac, superficial femoral and popliteal veins.
CT was performed showing compression of the left common iliac vein between the right iliac artery and the 4th lumbar vertebra, this conditioned an extensive thrombosis of the left iliofemoral-popliteal axis with a small thrombus in the inferior cava vein. Due to the severeness of findings thrombolysis was immediately started using rTPA over 3 days. This led to a resolution of thrombus in the superficial and common femoral veins, but there was significant residual stenosis and thrombus in the left common and external iliac veins. Finally the patient was subjected to percutaneous transluminal angioplasty and stenting from left common iliac vein to left external iliac vein (Fig 10).
Fig. 1: Drawing illustrates May-Thurner syndrome: compression of the left CIV between the right CIA and the anterior surface of the underlying vertebral body.

Fig. 2: Fig.2: 31 year-old female. Coronal reformatted MRI images show thrombus in the left external iliac (a) and common femoral (b) veins.

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Fig. 3: Fig.3: Same patient as Fig.2: Axial CT image showing compression of the left common iliac vein by the right common iliac artery at its origin against the lumbar spine

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Fig. 4: Fig.4: 41 year-old male. Ascending venogram obtained prior to intravenous Urokinase thrombolysis shows a thrombus extending into the common and superficial femoral veins.

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Fig. 5: Same patient as Fig 4. Repeat ascending venogram obtained after 7 days Urokinase infusion shows left common iliac and common femoral veins partial revascularization.
Fig. 7: Fig.7: 82 year-old female,: Axial CT image of the pelvis shows left common iliac vein thrombosis (red arrow) because of compression between a elongated left common iliac artery (yellow arrow) and a underlying vertebral body.

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**Fig. 8:** Same patient as Fig.7. Coronal reformatted CT images. (a): Elongated left common iliac artery. (b): Left common iliac vein thrombosis.

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**Fig. 9:** 14 year-old female. (a) Coronal reformatted CT image shows an increased of collateral circulation around the left kidney. (b) Axial CT image of the pelvis shows an increased of collateral circulation around the uterus.

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**Fig. 10:** 30 year-old female. Percutaneous transluminal angioplasty and stenting from left common iliac vein to left external iliac vein. Image b shows a precise deployment of the Wall Stent with an optimal flow in the left common iliac vein.

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Fig. 6: Same patient as Fig 4. (a) Digital spot radiograph shows a stent that was placed in the left CIV. (b) Final venogram shows a precise deployment of the Wall Stent with an optimal flow in the left common iliac vein.

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Conclusion

May Thurner syndrome is a rare cause of left DVT that the radiologist must suspect it in the presence of an acute ilio-femoro-popliteal DVT of the left lower limb, especially in the case of young women with thrombotic risk factors, because the radiological knowledge of this entity helps both the diagnosis and the choice of the best treatment, improving the outcome of the patient.
References


