Postthrombotic Syndrome Complicating a Case of May-Thurner Syndrome Despite Endovascular Therapy*

Case Report and Review

Bruce Ludwig, MD; Tony Han, MD; and Dennis Amundson, DO, FCCP

External compression of the left iliac vein is a common finding in the general population. It may predispose patients to the development of deep vein thrombosis (DVT) of the left leg and may also lead to a more complicated course than in other types of DVT. This entity has been well-described by other authors. External compression of the left iliac vein should be suspected in cases of complicated DVT or in cases of DVT with no predisposing factors. We describe a case of May-Thurner syndrome that involved a complicated treatment course, and a review of current options for diagnosis and therapy.

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Key words: Cockett syndrome; iliac compression syndrome; May-Thurner syndrome; venous thrombosis

Abbreviations: DVT = deep venous thrombosis; MRV = magnetic resonance venography

May and Thurner, in 1956, described anatomic variations of the left common iliac vein that resulted in lower extremity venous outflow obstruction in 22% of 430 cadavers. Fibrous vascular lesions called spurs were found at the level where the right iliac artery compressed the left iliac vein against the fifth lumbar vertebra (Fig 1).

In 1965, Cockett and Thomas reported a series of 35 patients with the clinical entity of iliofemoral venous thrombosis with iliac vein obstruction. The majority of these patients were found to have involvement of the left lower extremity, and all of the patients who underwent surgical exploration showed fibrous obstruction of the left iliac vein. Now known as the May-Thurner syndrome or iliac compression syndrome, a myriad of symptoms related to venous obstruction, including acute DVT, chronic unilateral leg edema, pain, and varicosities, can develop in affected patients. A variety of surgical therapies have been used to correct the obstruction and relieve symptoms. Most recently, endovascular therapies, including angioplasty with stent placement, have become common as a less invasive means to accomplish the same goals. We present the case of a patient with May-Thurner syndrome and factor V Leiden who was treated with iliac vein stenting, which was complicated by thrombosis of the stent and persistent symptoms despite collateral blood flow.

CASE REPORT

A 35-year-old white woman presented to our emergency department 6 days after undergoing bilateral breast reduction and abdominoplasty complaining of left lower extremity swelling for 24 h; the surgery had lasted approximately 8 h but was otherwise uncomplicated. On the day of hospital admission, the patient noted acute swelling of the left leg, with left thigh pain and difficulty ambulating. She complained of mild dyspnea but thought it was related to the compressive abdominal binding used postoperatively. She denied chest pain, fever, and chills. She reported no prior personal or family history of thromboembolic disease. She had undergone uncomplicated bilateral tubal ligation remotely. Her medications included acetaminophen/hydrocodone, diazepam, iron supplements, norgestrel/ethinyl estradiol (Lo/Ovral; Wyeth Laboratories; Philadelphia, PA), and perioperative cephalexin. She reported smoking up to three packs of cigarettes a day, but had quit approximately 2 months prior to undergoing surgery. The findings of a physical examination were remarkable for tachycardia, mild tenderness at her abdominal incision site, and marked swelling and tenderness of the left leg. Chest radiographs showed no evidence of cardiopulmonary disease. Left lower extremity duplex compression ultrason sound confirmed a diagnosis of deep venous thrombosis (DVT) with noncompressible segments of the common femoral, superficial femoral, and popliteal veins. The findings of a hypercoagulability workup, including tests for antiphospholipid antibodies and prothrombin gene mutation, were negative with the exception of heterozygosity for factor V Leiden. The patient was treated with enoxaparin and warfarin, in addition to analgesics. She did well and was discharged from the hospital while receiving therapy with oral warfarin.

Despite an initial decrease in pain and edema while receiving therapeutic levels of warfarin, she presented 2 months later with a week of progressive left leg pain and swelling. A lower extremity
compression ultrasound showed progression of the clot into previously uninvolved segments of the left deep venous and pelvic venous system. The patient began therapy with IV unfractionated heparin, and she underwent a venogram that showed extensive thrombosis with significant collateral blood flow along with high-grade stenosis at the origin of the left common iliac vein. She was treated with catheter-directed thrombolysis. A follow-up venogram (Fig 2) showed a significant reduction in clot burden with persistent stenosis consistent with May-Thurner syndrome. A total of four stents was then placed in the common iliac vein, external iliac vein, and common femoral vein. In light of the occurrence of thrombosis while receiving warfarin, the patient was treated with an extended course of subcutaneous enoxaparin. She did well with a decrease in her leg symptoms and was discharged from the hospital to receive outpatient treatment.

Approximately 3 weeks later, she presented again with increasing left leg pain and swelling. A compression ultrasound showed a persistent thrombus in the deep venous system but no clear evidence of extension of the thrombus, and the stents appeared to have appropriate flow. Despite persistent symptoms, multiple sonographic studies showed a stable thrombus and an apparently patent stent until 5 months after stent placement. At that time, a left lower extremity Doppler ultrasound failed to show blood flow in the proximal stent, suggesting the presence of an obstruction. A venogram showed patent popliteal and femoral veins with chronic occlusion of the left iliofemoral stents and prominent transpelvic collateral blood flow providing good venous decompression. The patient continues to have symptoms of leg edema, pain, and venous claudication. Repeat ultrasound tests have confirmed stent occlusion but show no evidence of new thrombosis.

**Discussion**

Historically, it has been noted that lower extremity DVT is more common on the left than on the right. Virchow noted that the occurrence of thrombosis was five times more common on the left side. In 1906, McMurrich noted the presence of strictures in the common iliac vein and thought that these were congenital in origin, causing left iliofemoral venous thrombosis. In 1956, May and Thurner observed focal intimal vascular thickening with web or septae formation in 22% of an autopsy series of 430 patients. They noted that in these cases, the right iliac artery crossed anteriorly to the left iliac vein, compressing it against the fifth lumbar vertebral body, as illustrated in Figures 1 and 3. They proposed that the pulsatile right iliac artery might cause chronic injury to the left iliac vein, resulting in pathologic findings due to intimal fibrosis. Significantly, they noted the absence of these lesions in fetal autopsies, thus supporting their belief that the lesion is acquired rather than congenital.

The clinical features of May-Thurner syndrome were first described by Cockett and Thomas in 1965, and, indeed, this entity carries the eponym of Cockett syndrome in Europe. Most authors have described a female predominance for the condition. The classic presentation is that of a woman in her third or fourth decade of life presenting with a left leg DVT after a period of immobilization due to an unrelated condition. Without definitive treatment, chronic edema, recurrent DVT, and venous claudication may ensue over the years. The true prevalence of May-Thurner syndrome remains debatable. It has been estimated to occur in 2 to 3% of all lower extremities. Various authors have reported a 49 to 62% prevalence of May-Thurner anatomy in patients with DVT. Wolpert et al reviewed 24 patients with isolated left lower extremity swelling; 7 patients (29%) were found to have DVT, while 9 patients (37%) had evidence of May-Thurner anatomy without DVT by magnetic resonance venography (MRV). Kibbe et al reported a series of 50 consecutive patients who had undergone abdominal CT scans for reasons unrelated to venous thrombosis. They found that among these patients 24% had > 50% compression of the left iliac vein, and 66% had > 25% compression. No patient in this series had left lower extremity edema or other signs or symptoms of venous obstruction.

The finding that many patients with iliofemoral compression remain asymptomatic raises the question of whether this represents a normal anatomic variant. On the other hand, some patients with this vascular abnormality develop significant symptoms of chronic venous outflow obstruction, including pain, unilateral lower extremity edema, venous claudication, varicose vein formation, venous stasis ulceration, and unprovoked DVT. Although, the true incidence of thrombosis in the setting of iliac compression syndrome is uncertain, there is evidence that patients in whom thrombosis develops may be at higher risk for recurrent DVT. Mickley et al have reported on a series of selected patients who underwent thrombectomy for iliofemoral thrombosis. Of the patients with left-sided thrombosis, 49% had venous spurs found...
Prior to 1994, those spurs were untreated, and 72% of those patients had recurrent occlusive thrombosis despite treatment of at least 1 year with vitamin K antagonists. In comparison, recurrence occurred in only 1 of 28 similarly treated patients (4%) with either right-sided thrombosis or left-sided thrombosis without spur formation.

In patients in whom suspicious signs or symptoms develop, the diagnosis of May-Thurner syndrome is best made radiographically. Other causes of these symptoms, including trauma, postsurgical changes, pelvic masses, and radiation, must be excluded. Classically, the study of choice has been contrast venography, which shows compression of the iliac vein with spur or web formation. May and Thurner\(^3\) have advocated the use of pressure differentials to support the diagnosis of hemodynamically significant obstruction. They have suggested\(^3\) that a pressure differential between the two iliac veins of 2 mm Hg at rest or 3 mm Hg with exercise is significant and that an exaggerated pressure response to exercise is a marker of significant obstruction.\(^3\) Other authors have utilized inferior vena caval pressure as a surrogate for contralateral iliac vein pressures with the assumption that there should be little or no gradient between the inferior vena cava and the iliac vein unless obstruction is present.\(^9\) Venography has the benefit that if an obstructive lesion exists, angioplasty or stenting can be performed during the same procedure. MRV can be used to evaluate the iliac veins noninvasively. MRV can also detect pelvic masses or other causes of external compression simultaneously. However, if therapy were needed, a second procedure would be required.\(^5\)

**Figure 2.** Venogram after catheter-directed administration of tissue plasminogen activator demonstrating persistent stenosis (arrowhead), which is consistent with the May-Thurner syndrome.
Therapy for May-Thurner syndrome has evolved over the years. Conservative therapy with compressive stockings has been largely unsuccessful, likely due to the proximal mechanical nature of the obstruction. Many surgical procedures for the relief of obstruction have been described. Venovenous bypass procedures utilizing graft material have enjoyed moderate success. Other authors have discussed mobilizing the right common iliac artery off the left iliac vein with the interposition of a peritoneal flap, a fascia lata sling, or a prosthetic bridge to prevent recurrent damage. The best results have been seen with vein patch angioplasty, with rerouting of the right iliac artery to a retrocaval position. This procedure involves opening the iliac vein with the resection of the fibrous septa or web. The vein is closed with a patch angioplasty using a segment of cephalic vein that has been reanastomosed with an interposition autograft to minimize the tension on the graft. Taheri et al have reported an 80% success rate with this procedure using either a transabdominal or retroperitoneal approach.

Most recently, with the advancement of endovascular treatments, percutaneous angioplasty with stent placement has been utilized. Although iliac vein stenting had been performed previously for other reasons, Berger et al were the first to describe catheter-directed thrombolysis followed by angioplasty with stent placement for the treatment of angiographically proven May-Thurner syndrome. At the 6-month follow-up, their patient remained asymptomatic, and the stent appeared to be patent by ultrasonography. Several case reports and series followed that, despite variable durations of follow-up, demonstrated excellent stent patency and clinical improvement in nearly 100% of the patients treated. Subsequent case series have reported more modest success rates. Heijnen et al reported a series of six patients in whom self-expanding stents were placed for the treatment of symptomatic May-Thurner syndrome that had been diagnosed by venography; they reported symptomatic improvement in five of the six patients. One patient had initial improvement followed by occlusion of the stent with recurrent symptoms 1 month after undergoing the procedure. In the series by Mickley et al that was described before, after 1994 percutaneous stents were placed when venous spurs were found interoperatively. The recurrence of thrombosis was reduced to 25% of those patients who received stents. They reported a primary patency rate of 73% and a secondary patency rate of 82% with a 2-year follow-up. No other complications were reported. Patel et al reported a series of 10 patients treated by catheter-directed thrombolysis followed by iliac vein stent placement with a 100% initial success rate. Subsequently, two patients developed in-stent thrombosis. One was symptomatic and with repeat thrombolysis had complete resolution of symptoms. The other remained asymptomatic despite complete iliac vein occlusion with well-developed collateral flow. Lamont et al presented a prospective evaluation of stent patency and symptom control in patients who were retrospectively identified as having had

![CT scan demonstrating compression of the unopacified left iliac vein (arrowhead) as it passes under the right iliac artery.](http://journal.publications.chestnet.org/pdfaccess.ashx?url=/data/journals/chest/22043/ on 06/27/2017)
stent placement for May-Thurner syndrome with or without DVT. After a median follow-up period of 16 months, 12 of the 15 patients remained asymptomatic. All three of the symptomatic patients were reported to have mild symptoms. Stent occlusions developed in two patients; one patient had mild edema, and the other remained asymptomatic.17

**CONCLUSION**

We have reported a case of May-Thurner syndrome with recurrent venous obstruction and have presented a summary of the current approach to its diagnosis and management. This vascular anomaly seems to be under-recognized and should be considered in cases of left leg DVT in young patients without other obvious causes or in cases of chronic, persistent left leg edema. Although no consensus exists regarding the best treatment, and clinical data are limited to a small number of case series and reports, patients in whom May-Thurner syndrome is diagnosed may be at higher risk of recurrent thrombosis. Consideration can be given to prolonged anticoagulation or stent placement for the relief of mechanical obstruction. Further clinical trials are warranted to define the optimal treatment strategy. It is hoped that early diagnosis and treatment would avoid complications, such as the postphlebitic syndrome seen in our patient.

**REFERENCES**

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