

## Comparison of the Treatment Outcome Data of Patients with May-Thurner Syndrome in Tan Tock Seng Hospital, Singapore: Is Anticoagulation as Effective as Thrombolysis?

Annamarie and Sule AA\*

Department of General Medicine, Tan Tock Seng Hospital, Singapore

### \*Corresponding author:

Ashish Anil Sule,  
Department of General Medicine, Tan Tock Seng Hospital, 11 Jalan Tan Tock Seng, 308433, Singapore, Fax: 63577588;  
E-mail: ashish\_anil@ttsh.com.sg

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## 1. Abstract

May-Thurner Syndrome (MTS), which is a condition wherein the left iliac vein is compressed by the right iliac artery against the vertebral body, is usually diagnosed when a patient present with deep vein thrombosis. There are different treatment options in treating patients with MTS.

In this study, ten (10) patients who initially presented with left lower extremity Deep Venous Thrombosis (DVT) were subsequently found to have May-thurner syndrome by CT scan. Six (6) of these patients received anticoagulation, two (2) underwent catheter-directed thrombolysis followed by stenting, one (1) underwent Inferior Vena Cava (IVC) filter insertion due to high risk of bleeding and one (1) underwent left femorocaval bypass graft. They were followed up regularly and symptoms were noted. A repeat scan and monitoring of symptoms showed that patients on anticoagulation did equally well compared to those with thrombolysis.

## 2. Background

May-Thurner Syndrome (MTS) is a condition wherein the left iliac vein is compressed by the right iliac artery against the vertebral body. It is usually diagnosed when a patient present with deep vein thrombosis. The true incidence rate of MTS is unknown and was said to range from 22% to 32% according to the autopsy studies done in the early 20th century [1, 2]. There are no known risk factors for the development of MTS but this condition has been noted to be more common in women [3, 4].

The goal of treating MTS is to clear the thrombus present in order to prevent post-thrombotic syndrome and to correct the underlying compression of the iliac vein. Anticoagulation, though not aimed at correcting the compression, is an option in treating MTS-related DVT in patients who have contraindication to more invasive treatment options such as femorocaval bypass, thrombectomy, thrombolysis and stenting.

Currently, endovascular therapy is the mainstay of treatment for May-Thurner syndrome. Review of literature supports that treatment via catheter-directed thrombolysis followed by stenting provides good early results [3-9].

## 3. Methods

Patients admitted at Tan Tock Seng Hospital, Singapore with left lower limb swelling and in whom deep vein thrombosis was highly suspected underwent US Doppler of their lower limbs. Once DVT has been established, patients were screened for their risk factors. As most of the patients who were found to have deep venous thrombosis were over 70 years of age, malignancy has to be excluded. (Table 1 shows the demographics of the patients who were included in this study.) Thus, they underwent CT abdomen and pelvis. The patients who were reported to have MTS on CT scan were either given anticoagulation (either warfarin or rivaroxaban), underwent CDT (with rTPA) with stenting or had femorocaval graft bypass. Those who underwent CDT with stenting had post-procedure venogram done. All patients were followed up in the clinic regularly and followed up for 1 year, while monitoring

their symptoms clinically, keeping the INR within therapeutic levels for those on warfarin and trending their d-dimer levels as well.

A year after being treated for their MTS-related DVT, a repeat US Doppler and/or CT abdomen was done.

**Table 1:** Demographics and baseline characteristics

	All patients N = 10
Age at diagnosis (Ave)	70.5 years
Sex	7 females, 3 male
BMI (Ave)	23.6
Race	9 Chinese, 1 Malay
Risk Factors	
Malignancy	2
Long haul flight	1
Previous DVT	1

## 4. Results

Ten patients presenting with acute left lower extremity swelling were noted to have DVT likely secondary to the presence of MTS. 6 patients were given anticoagulation (warfarin or rivaroxaban). One patient had IVC filter inserted just to avoid the development of pulmonary embolism. Two of the 10 patients had CDT with stenting and one patient had femorocaval graft bypass. All were followed up and clinical and/or sonographic changes were noted.

On follow up, 100% of the patients who were put on anticoagulation were noted to have significant clinical improvement, although 16% (1 out of 6) developed post-thrombotic syndrome. The average Vallalta score dropped from 9→3 on follow up in 12 months. On repeat scan, 33% (2 out of 6) of these were noted to have chronic thrombosis and another 66% were noted to have clearance

of their thrombosis. D-dimer was elevated in patient with partial resolution. One (1) patient who had IVC filter insertion was noted to persistent left lower extremity swelling with subsequent development of PTS. From the group who underwent CDT with stenting, 100% (2 out of 2 patients) showed significant clinical improvement and no PTS developed in this population (Vallanta score dropped from 6→1) over 1 year. There was no reported significant peri-procedure bleeding. For the patient (1) who underwent femorocaval bypass, five days after the surgical procedure, he developed graft thrombosis. He was given warfarin on discharge. He was also noted to have post-thrombotic syndrome on subsequent follow up. His recent CT scan showed a stable left femorocaval bypass graft although the patency cannot be accurately assessed. table 2 shows the outcome of the different treatment options for DVT.

**Table 2:** Clinical and radiological improvement over 1 year

	Anticoagulation N = 6	IVC Filter Insertion N = 1	CDT with stenting N = 2	Femorocaval Bypass N = 1
Significant improvement in clinical improvement with drop in Vallalta score on treatment (i.e swelling, tenderness, calf tightness, erythema)	6	1	2	0
Post-thrombotic syndrome	1 (mild)	1	0	1
Repeat Scan		No		
Yes	4		2	1
Chronic partial thrombosis	2		0	1
Complete resolution	4		2	0
D-dimer	Stable elevation in 2 patients with chronic thrombus	Not done	Normal	Not done

## 5. Discussion

### 5.1. MTS and Anticoagulation

The standard of treatment for patients with DVT is anticoagulation. This helps in reducing the risk of having recurrence of DVT and developing pulmonary embolism. However, this does not effectively remove the existing clot [10]. Historically, May-Thurner syndrome has been treated with anticoagulation therapy as well. But this therapy can be problematic when given alone because it does not treat the underlying mechanical compression. Thus, in MTS managed by anticoagulation therapy alone, there is a significant chance that the patient will develop recurrent deep vein thrombosis, post thrombotic syndrome or both [11].

### 5.2. MTS and Endovascular Treatment

Management of May-Thurner syndrome has evolved over the past few decades favouring endovascular management as the primary treatment. In a retrospective study done by Bozkaya, et. al, data on 23 MTS patients were studied and showed that endovascular treatment of MTS is safe and effective and reduces symptoms in most patients, associated with high medium-term patency rates. It was noted that complete left common iliac vein patency was achieved in 21 of the 23 patients and complete thrombolysis was observed in 14 of the 18 DVT. Complete symptomatic regression was observed in 19 of the 23 patients on further follow up. Stent patency was complete in 19 of the 21 patients who received stents. 12 Another review was done by Moudgill, et al, involving 6 studies contain-

ning at least 5 cases of MTS treated with endovascular therapy. The mean technical success of catheter-directed thrombolysis with stenting was 95% with a mean 1-year patency of 96%.<sup>4</sup> Endovascular stenting should therefore be the primary choice for treating MTS [13, 14].

### 5.3. MTS and surgical approach

Procedures to correct chronic venous obstruction include venous bypass (including saphenofemoral and ilioiliac crossover), arterial repositioning, fascia lata sling, peritoneal flap, patch angioplasty, and aortic reconfiguration.<sup>13</sup> However, open surgical reconstructions are challenging, and the success of the operation depends on the type of conduit, the graft material, adequately low venous pressure, and the presence of thrombophilia [15].

Today, MTS patients rarely undergo highly invasive venous surgical reconstructions because management using endovascular techniques has been relatively successful, and is associated with fewer operative risks [16, 17].

### 6. Conclusion

There are multiple treatment options for patients with MTS. Anticoagulation may be considered in patients with contraindication for more invasive procedures (i.e. thrombolysis with stenting or graft bypass). About 80-90% resolution of thrombosis may be expected with anticoagulation alone which could be as good as catheter-directed thrombolysis with stenting. For femorocaval bypass graft as a treatment option for anticoagulation, re-thrombosis of the graft occurred in the only patient treated.

In view of the safety of newer anticoagulants, treatment with anticoagulation could be a good option for treatment of MTS with very good efficacy and minimal side effects compared to thrombolysis.

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