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Case Series

Role of Interventional Cardiologists in Lower Limb Swelling/DVT -Case Series on May-Thurner Syndrome and its Variants

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ABSTRACT

May-Thurner syndrome is a disorder of left common iliac vein compression by an overriding right common iliac artery that leads to deep venous thrombosis (DVT), commonly seen in young to middle-aged women. This obstruction may cause leg swelling, varicosities, deep venous thrombosis, chronic venous stasis ulcers, or more serious complications, such as pulmonary embolism. The diagnosis requires high clinical suspicion. Computed tomography venography depicts the extent of venous thrombosis and iliac venous compression in patients with underlying thrombotic and non-thrombotic pathologies. Endovascular ultrasound is highly useful to detect early mural changes and accurately quantify venous narrowing. Endovascular intervention with balloon dilatation and stenting with or without pharmacomechanical thrombectomy followed by long-term anticoagulation is the preferred treatment. We report a series of 9 patients presenting with deep vein thrombosis, varicosities and leg ulcers diagnosed by peripheral angiography and CT Venography. 8 patients received the percutaneous intervention (6 stenting and 2 balloon dilatation), 1 patient received medical management.

Key words: May-Thurner syndrome, DVT, Common Illiac vein, Percutaneous transluminal angioplasty, Thrombosis.

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BACKGROUND

May–Thurner syndrome is caused by compression of the left common iliac vein by the right common iliac artery, resulting in symptoms of venous obstruction, insufficiency, leg ulcers, varicosities and deep vein thrombosis. The incidence rate of May–Thurner syndrome is unknown and perhaps ranges from 22 to 32% according to the autopsy studies in the early twentieth century. However, May–Thurner syndrome related deep venous thrombosis accounts for only 2%-3% of all lower limb deep vein thrombosis. It is also known as iliac vein compression syndrome or Cockett's syndrome.[1] McMurrich initially reported the association of common iliac vein compression with an increased incidence of left lower deep vein thrombosis, thought to be congenital.[2] Ehrich postulated acquired degenerative obstruction at the origin of the left common iliac vein.[3] May and Thurner described compression of the left common iliac vein from the right common iliac artery, resulting in mural spur formation and deep vein thrombosis.[4]

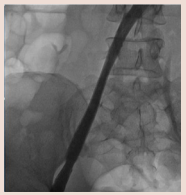
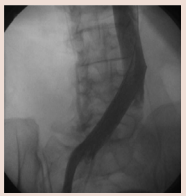
CASE PROFILE

We report a case series of 9 women patients aged 20-40 years, of which 6 patients had left lower limb swelling and 3 patients had right lower limb swelling. The demographic characteristics of the patients are shown in Table 1. There was no history of smoking, bleeding disorders in the family, no history of connective tissue disorder, malignancy, hypercoagulable syndrome, trauma, surgery, travel, recurrent miscarriage, and no history of consumption of oral contraceptive pill, routine blood examinations were normal, chest X-ray is normal, coagulation profile includes protein C, protein S, antithrombin III, and antinuclear antibodies (ANA) were normal, comprehensive metabolic (Homocysteine, apo-lipoproteins, thyroid) panel, ECG, 2D Echocardiograph were within normal limits. On examination 6 patients had left lower limb swelling and 3 patients had right lower limb swelling. Lower extremity Doppler was significant for extensive thrombosis of left common femoral, Iliac, femoral, great saphenous, posterior tibial, popliteal, and peroneal vein as shown in Table 2. All the patients underwent peripheral angiogram which revealed compression of the left common iliac vein by the right common iliac artery in 6 patients and right common iliac vein compression by a right common iliac artery in 3 patients. 3 patients underwent catheter-directed thrombolysis with streptokinase with catheter laid across femoral and iliac veins with a closer monitoring of complete blood count and coagulation profile. Subsequently, 2 patients underwent ballooning angioplasty with good iliac and pelvic venous runoff and 6 patients underwent percutaneous transluminal angioplasty (PTA) with stenting and one patient had completely recanalized vessel after catheter-directed thrombolysis details shown in Table 2. All the patients were started with

Table 1: The demographic characteristics of the patients.

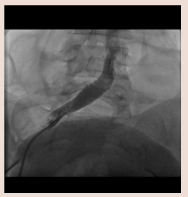
Patient No	Age	Sex	Presenting complaints	H/o DM/ HTN	Prior IHD
I	33	F	Left lower limb DVT.	No	No
II	40	F	Left lower limb DVT.	No	No
III	21	F	Left lower limb DVT.	No	No
IV	35	F	Right lower limb DVT.	No	No
V	38	F	Right lower limb DVT.	No	No
VI	28	F	Right lower limb DVT.	No	No
VII	42	F	Left lower limb DVT.	No	No
VIII	31	F	Left lower limb DVT.	No	No
IX	40	F	Left lower limb DVT.	No	No

Table 2: **Patients interventional profiles.**

Patient no.	Peripheral angiography	Lesion/ Thrombosis	Thrombolysis	Predilatation with balloon	Revascularization /Stent	Post dilatation with bollon	Results	Figures
1	ILIAC, FEMORAL AND POPLITEAL VEIN	Left lower limb DVT.	-	8X80mm Cuba balloon	Self Expanding Stent 14 * 120 Mm Wall Stent	14*40 Balloon	brisk antegrade flow with a good run off in common iliac veins	 **Figure 1A:** Peripheral Angiography showing Iliac and femoral vein occlusion.  **Figure 1B:** Peripheral Angiography showing Final result with a good runoff in common iliac veins.
2	ILIAC AND FEMORAL VEIN	Left lower limb DVT.	CATHETER DIRECTED LYSIS	6X40mm Cuba balloon	9*60 Balloon Expandable Stent	-	brisk antegrade flow with a good runoff in common iliac veins	 **Figure 2A:** Peripheral Angiography showing iliac, femoral and popliteal vein occlusion.  **Figure 2B:** Peripheral Angiography Showing final result with the antegrade flow and good runoff in common iliac veins.

Continued....

Table 2: Continued

Patient no.	Peripheral angiography	Lesion/ Thrombosis	Thrombolysis	Predilatation with balloon	Revascularization /Stent	Post dilatation with bollon	Results	Figures
3	ILIAC	Left lower limb DVT.	CATHETER DIRECTED LYSIS	16X30mm Cuba balloon	16*30 Balloon Expandable Stent	-	good Pelvic venous runoff	 **Figure 3A:** Peripheral Angiography showing iliac vein occlusion.  **Figure 3B:** Peripheral Angiography showing final Results with good Pelvic venous runoff.
4	ILIAC, POPLITEAL VEIN	Right lower limb DVT.	CATHETER DIRECTED LYSIS	-	-	-	Good Pelvic venous runoff	 **Figure 4A:** Peripheral Angiography showing iliac and popliteal vein occlusion.  **Figure 4B:** Peripheral Angiography showing final Results good Pelvic venous runoff.

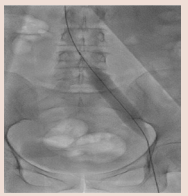
Continued....

Table 2: Continued

Patient no.	Peripheral angiography	Lesion/ Thrombosis	Thrombolysis	Predilatation with balloon	Revascularization /Stent	Post dilatation with bollon	Results	Figures
5	ILIAC, FEMORAL AND POPLITEAL VEIN	Right lower limb DVT.	-	6X40mm Cuba Balloon	18*90 Balloon Expandable Stent	18*65 Balloon	Good Pelvic venous runoff	 **Figure 5A:** Peripheral Angiography showing femoral and popliteal vein occlusion.  **Figure 5B:** Peripheral Angiography showing iliac, final results with the antegrade flow and good runoff in common iliac veins.
6	ILIAC	Right lower limb DVT.	-	6X40mm Vatsmed Balloon	18*90 Balloon Expandable Stent	18*65 Balloon	Good Pelvic venous runoff	 **Figure 6A:** Peripheral Angiography showing Iliac vein occlusion.  **Figure 6B:** Peripheral Angiography showing Final result with good Iliac and pelvic venous runoff..

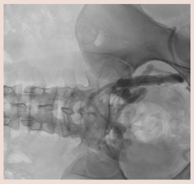
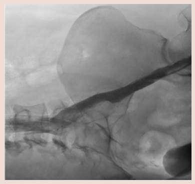
Continued....

Table 2: **Continued**

Patient no.	Peripheral angiography	Lesion/ Thrombosis	Thrombolysis	Predilatation with balloon	Revascularization /Stent	Post dilatation with bollon	Results	Figures
7	ILIAC	Left lower limb DVT.	-	6X40mm Vatsmed Balloon	-	-	Good Iliac and pelvic venous runoff	 **Figure 7A:** Peripheral Angiography showing Iliac vein occlusion.  **Figure 7B:** Peripheral Angiography showing Final result with good Iliac and pelvic venous runoff.
8	ILIAC	Left lower limb DVT.	-	6X30mm Cuba Balloon	-	-	Good Iliac and pelvic venous runoff	 **Figure 8A:** Peripheral Angiography showing Iliac vein occlusion.  **Figure 8B:** Peripheral Angiography showing Final result with good Iliac and pelvic venous runoff.

Continued....

Table 2: Continued

Patient no.	Peripheral angiography	Lesion/ Thrombosis	Thrombolysis	Predilatation with balloon	Revascularization /Stent	Post dilatation with bollon	Results	Figures
9	ILIAC	Left lower limb DVT.	-	6X40mm Cuba Balloon	16*60 Balloon Expandable Stent	8*60 Balloon	Good Iliac and pelvic venous runoff	 **Figure 9A:** Peripheral Angiography showing Iliac vein occlusion.  **Figure 9B:** Peripheral Angiography showing Final result with good Iliac and pelvic venous runoff.

anti-coagulants (Dabigatran) for a period of 6 months because it is provoked deep vein thrombosis advised Compression stock and repeated venous Doppler study performed during follow up.

DISCUSSION

May-Thurner syndrome was first described in 1957 when it was noted that 22% of 430 cadavers on autopsy possessed an anatomical variant in which an overriding right common iliac artery caused compression of the left common iliac vein against the lumbar spine. This compression is associated with intimal hyperplasia, which creates the potential for venous stasis and subsequently deep vein thrombosis.[5] Left iliac vein compression is the most common variant seen in May-Thurner syndrome; however, several other variants have been described in the literature. Compression of the left common iliac vein by the left internal iliac artery,[6] compression of the right common iliac vein by the right internal iliac artery,[7] compression of the IVC by the right common iliac artery[8] and right-sided May-Thurner syndrome in a patient with a left-sided IVC[9] have all been described. Despite the relatively high incidence of this anatomical variation, the clinical prevalence of May-Thurner syndrome -related DVT is surprisingly low.[10] It is thought that this low occurrence rate may be an underestimate of the actual prevalence due to missed diagnoses.[11] Usually seen in females between the age group of 20–40 years, the trauma from chronic arterial pulsation of the right common iliac artery is believed to cause deposition of elastin and collagen in left common iliac vein resulting in a spur formation.[5] Patients with May-Thurner syndrome usually present with acute or chronic unilateral left lower extremity swelling and pain. Some patients may present with skin pigmentation, chronic leg pain, and swelling, recurrent skin ulcers.[12] Few cases of iliac vein rupture due to May-Thurner syndrome have also been reported.[13] The clinical stages of iliac vein compression were described by Kim *et al.*[14] and include Stage I, asymptomatic iliac vein compression; Stage II, development of a venous spur; Stage III, development of left iliac vein DVT. CT venography, MR venography, intravenous ultrasound, or conventional venography can be used to confirm the diagnosis of May-Thurner syndrome in the suspected cases. With simple doppler ultrasound, it is very difficult to find pathology in the iliac vessels though there have been few case reports where the diagnosis of the May-Thurner syndrome was suspected on Doppler examination of the iliofemoral vessels.[5] May and Thurner,[4] have advocated the use of pressure differentials to support the diagnosis of hemodynamically significant obstruction. They have suggested that a pressure differential between the two iliac veins of 2 mmHg at rest or 3 mmHg with exercise is significant and that an exaggerated pressure response to exercise is a marker of significant obstruction. Other authors have utilized inferior vena cava 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 an obstruction is present.[15] May-Thurner syndrome is treated only when it is symptomatic. Previously open surgical procedures were done for repair of May-Thurner syndrome but with the advancement of technology less invasive endovascular repair has traditionally followed. The treatment is the removal of the clot with pharmacomechanical thrombolysis and mechanical thrombectomy to prevent post-thrombotic syndrome and to repair the anatomical defect with the use of stents and balloon angioplasty.[16]

CONCLUSION

May-Thurner syndrome is a common cause of left lower extremity swelling and deep vein thrombosis; however, it is underdiagnosed. In patients presenting with left-sided Deep Vein Thrombosis without obvious etiology, especially in young women, May-Thurner syndrome should

be considered as a possibility. Thrombolysis with Endovascular intervention and stenting remains the choice for successful outcomes.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ABBREVIATIONS

DVT: Deep Vein Thrombosis; **CT Venography:** Computed Tomography Venography; **PTA:** Percutaneous Transluminal Angioplasty; **IVC:** Inferior Vena Cava.

SUMMARY

May-Thurner syndrome is a common cause of left lower extremity swelling and deep vein thrombosis. A Thrombolysis with Endovascular intervention and stenting remains the choice for successful outcomes.

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