

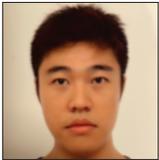


Vascular and Interventional Radiology Case Series

# Iliocaval stenting for May–Thurner syndrome: Initial experience

Matthew Ka Ki Law<sup>1</sup>, Hoi Kevin Chin<sup>1</sup>, Chi Yeung Chu<sup>1</sup>, Yip Kan Kendrick Tang<sup>1</sup>, Kam Wing Leung<sup>1</sup>, Wai Kuen Kan<sup>1</sup>

<sup>1</sup>Department of Radiology, Pamela Youde Nethersole Eastern Hospital, Chai Wan, Hong Kong.



**\*Corresponding author:**  
Matthew Ka Ki Law,  
Department of Radiology,  
Pamela Youde Nethersole  
Eastern Hospital, Chai Wan,  
Hong Kong.  
drmklaw@gmail.com

Received : 15 July 2022  
Accepted : 11 August 2022  
Published : 25 August 2022

DOI  
10.25259/JCIS\_82\_2022

Quick Response Code:



## ABSTRACT

The aim of this report is to describe our experience in endovascular treatment of May–Thurner syndrome. We report three cases of ilio caval stenosis treated endovascularly at our institution. We included three patients age range from 41 to 85 years with two presenting with acute deep vein thrombosis and associated limb swelling and one with chronic lower limb symptoms. We reviewed the technical success, complications, and stent patency on follow-up, latter was monitored by serial imaging. The three cases of ilio caval stenosis were treated with endovascular stenting with follow-up imaging follow-up period ranged from 6 to 13 months (mean 5.6 months) with two out of the three cases maintaining stent patency. One case was complicated by intraprocedural reopening of previously venous bleed. Clinical symptoms resolved with no recurrence in two out of three cases. One case experienced symptomatic in-stent thrombosis following endovascular treatment. Endovascular treatment of ilio caval stenosis appears effective in immediate technical success. Periprocedural attention to anticoagulation and stent position are important in preventing in-stent restenosis.

**Keywords:** Venous stent, Deep vein thrombosis, Chronic venous insufficiency, May–Thurner syndrome

## INTRODUCTION

Chronic venous insufficiency occurs in approximately 1–5% of adults. They are grouped into non-thrombotic or post-thrombotic causes, with the former primarily causing obstruction and latter potentially causing additional reflux. There is a relatively high risk of venous obstruction following acute deep vein thrombosis in approximately 70–80%<sup>[1]</sup> of patients. This may lead to edema, exercise related pain, hemosiderosis, lipodermatosclerosis, and skin ulceration.<sup>[2]</sup>

In the past, treatment of deep venous system obstruction used arterial stents, which lacked the radial force as well as satisfactory flexibility for effectiveness.<sup>[3–5]</sup> Subsequent studies have explored dedicated venous stents with reports of good safety, stent patency, and symptomatic improvement, including ulcer healing, reduction of edema, and reduction in rates of subsequent moderate-to-severe post-thrombotic syndrome.<sup>[6,7]</sup> Thus, guidelines have recommended endovascular relief of the ilio caval obstruction using stents.<sup>[1]</sup>

The current guidelines recommend a trial of non-invasive therapy before consideration of endovascular treatment.<sup>[7]</sup> Indications for endovascular therapy for non-thrombotic etiology have been extended to less advanced clinical stages, due to the low complication rate and clinical benefit, where high primary patency rates are demonstrated.<sup>[8]</sup> Whereas, for ilio caval thrombosis, endovascular treatment by stenting can be considered after demonstration of extrinsic iliac

compression on imaging, which can reach 80% of patients. Absolute contraindications are uncorrectable coagulopathy or systemic or local infection.<sup>[1]</sup>

The aim of this report is to describe our experience in endovascular treatment of May–Thurner syndrome in three patients.

## CASE 1

A 61-year-old woman presented with a history of the left lower extremity deep vein thrombosis 4 years prior, with CT scan confirming thrombus involving the left external iliac vein and extrinsic compression of the left common iliac vein by the right common iliac artery against lumbar vertebra, suggestive of May–Thurner syndrome [Figure 1]. There were no coagulopathy history and laboratory results showed normal platelet and coagulation profile. He had been on long-term warfarin for a history of deep vein thrombosis. There is no history of antiplatelet medication.

Venous access was obtained through the left great saphenous vein with venogram confirming the venous stenosis at the left common iliac vein with venous collateral flow seen [Figure 2]. The venous stenosis was crossed with 0.018 Glidewire<sup>®</sup> Advantage<sup>™</sup> Guidewire (Terumo) and 4Fr CXI<sup>®</sup> Support catheter (Cook Medical). Two Abre<sup>™</sup> stents (Medtronic) sized at 16 × 120 mm and 16 × 100 mm were placed after initial balloon angioplasty with Admiral<sup>™</sup> Xtreme balloon (Medtronic) sized 8 × 80 mm due to long length of stenosed vein. Control venogram still showed stenosis at the common femoral vein, near the junction of the great saphenous vein; therefore, another Abre<sup>™</sup> stent (14 × 60 mm) was applied to cover this segment with post-stent deployment dilatation with Atlas GOLD balloon (BD) sized 10 × 40 mm to treat the length of affected veins. Good angiographic flow through the stented veins was then confirmed on DSA with substantial reduction in collateral flow [Figure 3]. The patient's usual



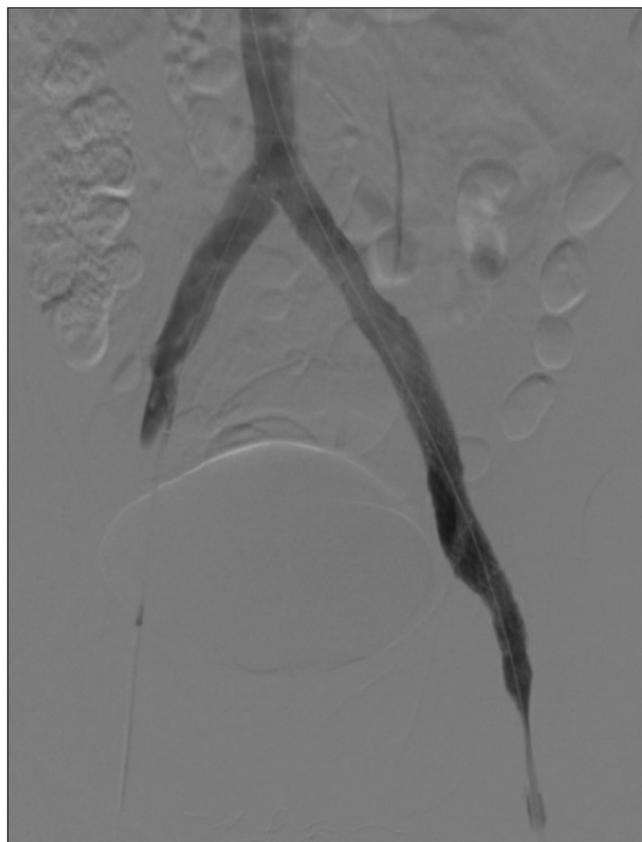
**Figure 1:** A 61-year-old lady presented with prior left lower limb deep vein thrombosis with CT confirmed May–Thurner's syndrome. Contrast-enhanced venous phase CT with compression of the left common iliac vein by the right common iliac artery against the lumbar vertebra (arrow).

Warfarin was continued after the procedure, but INR was subtherapeutic, no antiplatelets were given.

Contrast CT examination at 2-month follow-up showed significant in-stent restenosis without evidence of deep vein thrombosis distal to the stent; clinically, there was increased swelling.



**Figure 2:** DSA from the venous access at the great saphenous vein showing diseased left common iliac and left external iliac veins (arrow) with venous collaterals seen.

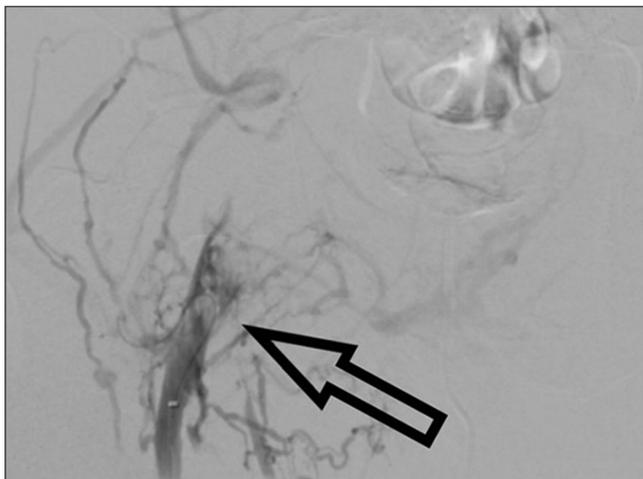


**Figure 3:** Post-procedure DSA shows technically successful stent deployment with substantial reduction in collaterals.

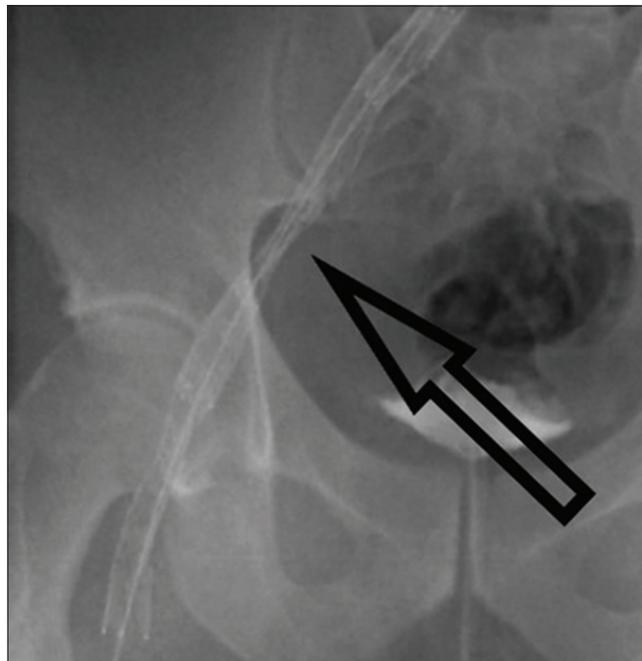
## CASE 2

A 41-year-old man presented with the left lower limb swelling with ultrasound confirmed deep vein thrombosis. CT confirmed thrombus involving the left common iliac vein extending to the upper portion of the left femoral vein and compression of the left common iliac vein by the right common iliac artery against the lumbar vertebra. There was no coagulopathy history and laboratory results showed normal platelet and coagulation profile. He had been on long-term dabigatran with no antiplatelet medication.

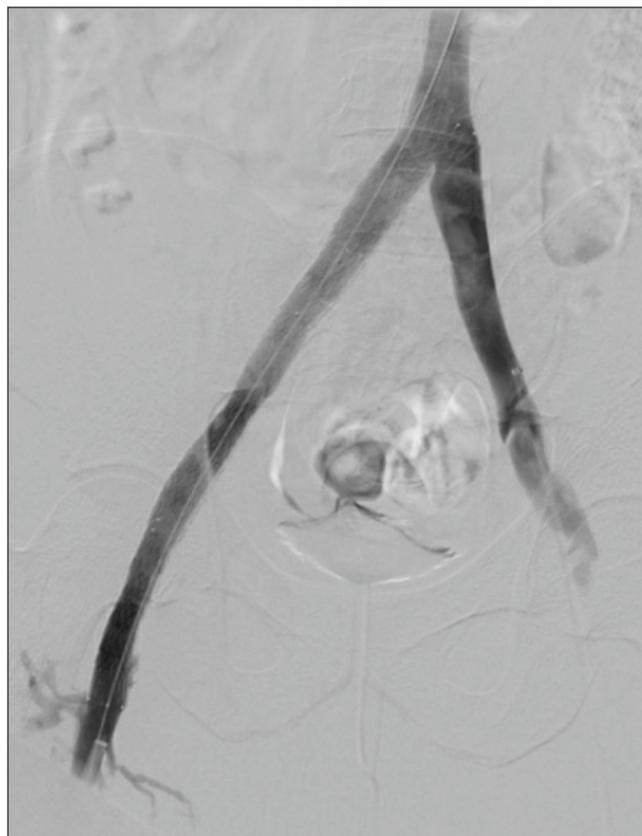
Due to the presence of thrombus at the left femoral vein, a Celect™ IVC filter (Cook Medical, Bloomington, IN, USA) was inserted before endovascular treatment of the left common iliac vein, through the right common femoral vein while in the supine position. Then, the left popliteal vein was accessed with ultrasound guidance while the patient was in the prone position. The left femoral venogram demonstrated occlusive thrombus involving the left common femoral vein [Figure 4]. Recanalization of the left external iliac and common iliac veins was performed with use of a 4Fr CXI® and 0.035" hydrophilic guidewire, followed by sequential balloon angioplasty with Conquest™ balloon. Then, three Venovo™ venous stents (BD Medical) sized 18 × 80 mm, 16 × 120 mm, and 16 × 80 mm were deployed and subsequent further balloon angioplasty with an Atlas® balloon sized 14 × 40 mm [Figure 5]. Post-procedure venogram confirmed patent left common and external iliac veins and satisfactory stent deployment with good flow on angiography through the left external iliac and common iliac veins was achieved with reduction in flow through collaterals [Figure 6].



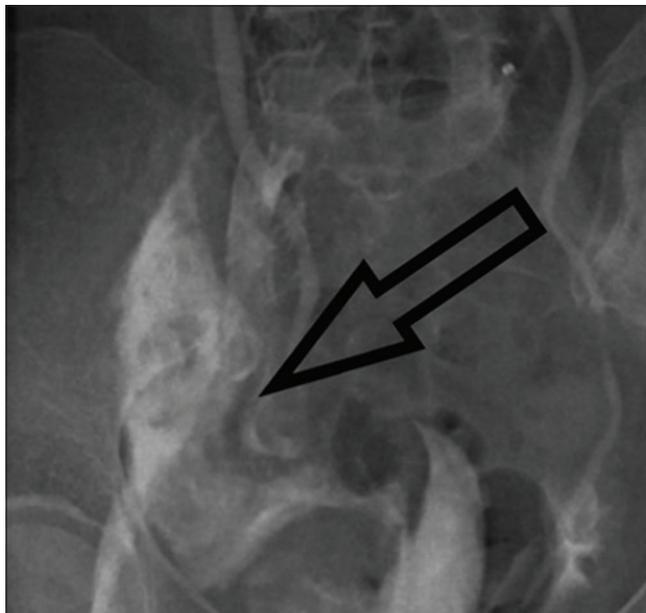
**Figure 4:** 41-year-old man with contrast enhanced CT findings compatible with May-Thurner Syndrome and thrombus from the left common iliac vein the upper portion of the left femoral vein. The venogram at the upper portion of the superficial femoral vein showing occlusive thrombus at the common femoral vein (arrow).



**Figure 5:** Placement of three stents performed, ensuring overlap, followed by post-deployment balloon angioplasty to achieve desired diameter (arrow).



**Figure 6:** Post-procedure venogram shows good flow through the stents with no substantial collateral flow.



**Figure 7:** An 85-year-old lady with CT findings compatible with May–Thurner syndrome and a left pelvic haematoma. Slow contrast extravasation to the known left pelvic haematoma is shown.

Contrast CT and ultrasound follow-up examinations up to 24 months follow-up show no in-stent restenosis and resolved of symptoms.

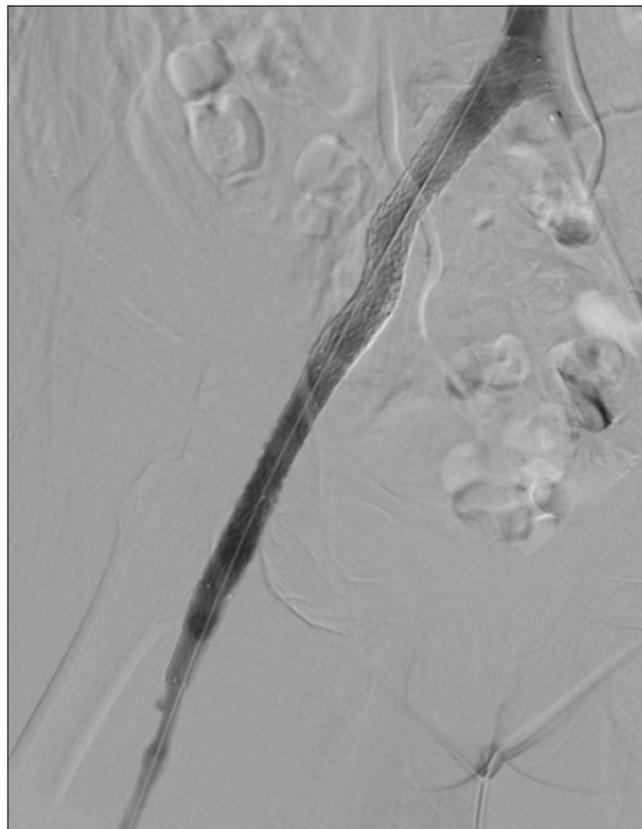
### CASE 3

An 85-year-old lady was admitted with the left-sided abdominal pain and left lower limb swelling. There was no coagulopathy history and laboratory results showed normal platelet and coagulation profile. No anticoagulant nor antiplatelets agent were found in the medication history.

Ultrasound confirmed left lower limb deep vein thrombosis with subsequent CT showing a large left pelvic hematoma, reaching 7 cm in size. In addition, the left common iliac vein was small in caliber and was externally compressed by the right common iliac artery, suggestive of May–Thurner syndrome.

An infrarenal IVC filter was inserted before endovascular treatment of the compression and thrombus. Preliminary ultrasound showed thrombus involving the left popliteal vein. The patient was initially in supine position for the right common femoral vein access with placement of a long sheath at the right common iliac vein. Preliminary ultrasound had shown thrombus involving the left popliteal vein, which was accessed with the patient in the prone position.

Endovascular mechanical thrombectomy was performed with 10Fr Aspirex<sup>®</sup> S catheter (BD Medical) from the left popliteal vein to the lower portion of the left common femoral vein, but slow extravasation of contrast was



**Figure 8:** Post-procedure digital subtraction angiogram demonstrating no extravasation nor gross collateral flow.

noted into the pelvis during procedure [Figure 7]. We proceeded with angioplasty of the diseased left common and left external iliac veins using a Conquest<sup>™</sup> balloon (BD Medical), deployment of two overlapping Venovo<sup>™</sup> stents with post-stent dilatation using Atlas<sup>®</sup> balloon. A further Venovo<sup>™</sup> was placed at the upper portion of the left superficial femoral vein, with post-balloon angioplasty using Conquest<sup>™</sup> balloon. Post-procedure venogram shows good angiographic result with stents placed over the left common iliac to superficial femoral veins, without angiographic evidence of further contrast extravasation nor gross collateral flow [Figure 8]. Subsequent transfusion of 2 units of packed red cells given for hemoglobin level of 8.7 g/dL with good response. No clinical bleeding was noted post-procedure.

Contrast CT follow-up examinations up to 13 months follow-up show no in-stent restenosis nor recurrence of symptoms on clinical notes.

### DISCUSSION

In this case series, we illustrated several cases highlighting our experience in the treatment of iliocaval stenosis using two of the available stents on the market. The procedures

described different approaches according to the length of diseased veins and presence of thrombus.

In our cases, imaging follow-up period ranged from 6 to 13 months (mean 5.6 months) with two out of the three cases maintaining stent patency. Clinical symptoms resolved with no recurrence in two out of three cases. One case experienced symptomatic in-stent thrombosis within a week of endovascular treatment. It was noted that the patient had been given warfarin with subtherapeutic INR.

As discussed above, final stent position is important for success. These include covering normal segment of veins, even if there is stent crossing the inguinal ligament level, and degree of stent protrusion into the IVC, to balance the right of contralateral iliac thrombosis with ipsilateral risk of restenosis.<sup>[1]</sup>

The management post-procedure is currently less well established, with some advocating novel oral anticoagulants for 6–12 months followed by lifelong anticoagulation in cases of recurrent deep vein thromboses.<sup>[9]</sup> Upcoming clinical trials may clarify post-endovascular management of this patient group. Involvement of hematology specialists in determining the optimal approach to post-procedure antiplatelet or anticoagulation treatment is advised.

## CONCLUSION

In conclusion, iliocaval stenting for May-Thurner syndrome has shown efficacy and safety. Our cases success in two of the three cases were demonstrated. Post therapy antiplatelet or anticoagulation planning with haematologists would be prudent until more developed guidance is available.

## Ethics Approval

The study was approved by Hong Kong East Cluster Research Ethics Committee (HKECREC-2022-011).

## Declaration of patient consent

The patients were treated in accordance with the tenets of Declaration of Helsinki. The requirement for patient consent was waived by the review board.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

- Mahnken AH, Thomson K, de Haan M, O'Sullivan GJ. CIRSE standards of practice guidelines on iliocaval stenting. *Cardiovasc Intervent Radiol* 2014;37:889-97.
- Neglén P, Raju S. Proximal lower extremity chronic venous outflow obstruction: Recognition and treatment. *Semin Vasc Surg* 2002;15:57-64.
- Shamimi-Noori SM, Clark TW. Venous stents: Current status and future directions. *Tech Vasc Interv Radiol* 2018;21:113-6.
- Seager MJ, Busuttill A, Dharmarajah B, Davies AH. Editor's choice--a systematic review of endovenous stenting in chronic venous disease secondary to iliac vein obstruction. *Eur J Vasc Endovasc Surg* 2016;51:100-20.
- Razavi MK, Jaff MR, Miller LE. Safety and effectiveness of stent placement for iliofemoral venous outflow obstruction: Systematic review and meta-analysis. *Circ Cardiovasc Interv* 2015;8:e002772.
- Badesha AS, Bains PR, Bains BR, Khan T. A systematic review and meta-analysis of the treatment of obstructive chronic deep venous disease using dedicated venous stents. *J Vasc Surg Venous Lymphat Disord* 2022;10:267-82.e4.
- De Maeseeneer MG, Kakkos SK, Aherne T, Baekgaard N, Black S, Blomgren L, *et al.* Editor's choice-European society for vascular surgery (ESVS) 2022 clinical practice guidelines on the management of chronic venous disease of the lower limbs. *Eur J Vasc Endovasc Surg* 2022;63:184-267.
- Wang S, He Y, Xin S, Zhang J. Iliac vein stenting is a safe and effective treatment for iliac vein compression syndrome: A systematic review of Chinese data. *Phlebology* 2020;35:752-70.
- Lin C, Martin KA, Wang M, Stein BL, Desai KR. Long-term antithrombotic therapy after venous stent placement. *Phlebology* 2020;35:402-8.

**How to cite this article:** Law MK, Chin HK, Chu CY, Tang YK, Leung KW, Kan WK. Iliocaval stenting for May–Thurner syndrome: Initial experience. *J Clin Imaging Sci* 2022;12:52.