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CASE REPORT

Ilio-Caval Venous Stenting for the Treatment of Severe Post-thrombotic Syndrome due to Multiple Sites of Iliac Vein Compression

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Abstract

Classical May-Thurner syndrome describes compression of the left common iliac vein. However, multiple sites of venous compression can occur. This report describes a case of ilio-caval venous thrombosis from multiple sites of iliac vein compression.

Keywords: May-Thurner syndrome, IVC thrombosis, Endovenous stenting

Introduction

May-Thurner syndrome (MTS) also known as iliac vein compression syndrome is an under-appreciated cause of ilio-femoral deep venous thrombosis (DVT). Left iliac vein compression is common, however, right sided and multi-site iliac vein compression have been described [1,2]. We report a case of bilateral iliac vein thrombosis from multiple sites of iliac vein compression with thrombus extending into the inferior vena cava (IVC) successfully treated with endovascular venoplasty and stenting.

Case report

A 74-year-old male with past medical history of hypertension presented to emergency department with sudden onset severe left calf and thigh swelling. Duplex ultrasound showed left ilio-femoral DVT. No obvious risk factors for venous thromboembolism were identified during index admission. He was discharged on dabigatran 150 mg twice daily for the unprovoked DVT. During first-month follow-up, he reported good drug compliance but persistent left lower leg swelling and pain. Clinically, post-thrombotic syndrome (PTS) was confirmed with Villalta Score of 16 over left leg and 8 over right leg, indicating severe PTS (Villalta score >15) on left side and mild (Villalta 5 to 9) PTS over right side. He was referred to us for endovenous intervention for severe PTS despite adequate anti-coagulation therapy.

9Fr sheaths were inserted into left and right popliteal veins under ultrasound guidance with patient in prone position. Venogram showed large occlusive organized thrombus from left common femoral vein (CFV) extending into left external iliac vein (EIV), left common iliac vein (CIV) and inferior vena cava (IVC) (Fig. 1). Right CIV was found to be significantly stenotic (Fig. 1). A 0.035 hydrophilic guidewire (Advantage, Terumo Somerset, NJ, USA) was used to cross the left iliac occlusion with microcatheter (Navicross, Terumo, Somerset, NJ, USA).
USA) support. Intravenous ultrasound (IVUS) (Vision PV, Volcano Inc.; Rancho Cordova, CA, USA) pullback interrogation from both sides confirmed the presence of IVC thrombus extending into left CIV. In addition, multiple sites of extrinsic compression by overlaying arteries were identified at left CIV, left EIV, and right CIV (Fig. 1A-F).

As the IVC thrombus was likely chronic and organized, the risk of embolization during venoplasty and stenting was low. Therefore, we proceeded with balloon venoplasty without IVC filter. Sequential pre-dilatations of left CIV, EIV and CFV were done with 6 mm, 8 mm and 10 mm balloons. A 20 mm × 100 mm venous self-expanding stent (Venovo, Bard Inc, Tempe, AZ, USA) was deployed from distal IVC below renal veins to above bifurcation of iliac veins under IVUS guidance (Fig. 2A and B). Following this, two kissing venous stents of 14.0 mm × 120mm (Venovo, Bard Inc) were deployed simultaneously from distal IVC confluence overlapping the first IVC stent and extending into bilateral CIV (Fig. 2C). Two more overlapping venous stents 12 mm × 100 mm and 80 mm (Venovo, Bard Inc) were deployed from left CIV to left CFV. Stents were post-dilated with 12 mm non-compliant balloons at high-pressure. Post stenting IVUS pullback confirmed satisfactory stent expansion and luminal gain against extrinsic compression (Fig. 3B to F). Final venography showed brisk venous flow without significant luminal obstruction or collateral venous flow (Fig. 3). Patient was switched to long-term vitamin K antagonist after

Fig. 1. Baseline ilio-caval venogram showing total occlusion of left EIV-CIV (marked by ^), thrombus at IVC (marked by *), and stenosis at right CIV (marked by #). IVUS pullback images from left side with 1A showing the large organized thrombus at IVC; 1B showing organized thrombus at left CIV with extrinsic compression by an artery; 1C showing compression of left EIV by an artery. IVUS pullback images from right side with 1D showing IVC thrombus extending into right side; 1E showing compression of right CIV by two arteries; and 1F showing stagnancy and dilated vein at distal right EIV. A: artery, CIV: common iliac vein, EIV: external iliac vein, IVC: inferior vena cava, IVUS: intravenous ultrasound, V: vein.
procedure while pending for full thrombophilia workup. He was encouraged to use bilateral compression stocking. On 3-month follow-up, he experienced significant symptom improvement with Villalta score reduced to 6 over both legs indicating only mild PTS.

Discussion

PTS is a common complication that can develop in nearly half of all patients who experience DVT [3]. The morbidity associated with PTS may be significant and patients can present with edema, chronic pain, swelling, skin changes, and heaviness of the affected limb. The main risk factors for PTS are anatomically extensive DVT, recurrent ipsilateral DVT, persistent leg symptoms 1 month after acute DVT, obesity, and older age [3]. MTS or iliac vein compression syndrome is an anatomical variant which is associated with an increased risk of iliofemoral DVT [1]. The classic MTS describes right common iliac artery overlying and compressing the left common iliac vein against the lumbar spine [1]. The most common site of compression is at the proximal left CIV [1], however, right sided and multiple sites of iliac vein compression have been described [2]. Venous compression can be difficult to diagnose by 2 dimensional venography [3]. Intravascular imaging with IVUS has been shown to be more sensitive in diagnosing extrinsic venous compression [4,5]. In our case, IVUS demonstrated the left proximal CIV and EIV compression (Fig. 1B and C), while the right distal CIV stenosis was likely caused by interposition between the external and internal iliac artery as shown on the IVUS (Fig. 1E).

Endovenous angioplasty and stenting is indicated for patients with symptomatic DVT or PTS due to MTS despite adequate anti-coagulation therapy [3]. Besides assessment of underlying pathology of venous obstruction, IVUS is also invaluable in the assessment of vessel size and lesion length for stent size selection [5]. In our case, IVUS assisted us to select the appropriately sized stent for good apposition to the IVC wall (Fig. 3D). As we have contralateral assess during the procedure, we also used real time IVUS to mark the level of the renal veins during the deployment of the IVC stent to avoid jailing of renal veins (Fig. 2).

Ilio-caval thrombosis represents the most extensive type of DVT and is most commonly associated with IVC filter placement [6,7]. In our patient however, the IVC thrombus is more likely an extension of the thrombus from the iliac vein instead of in situ thrombosis. Endovascular treatment with catheter-directed thrombolytics and stenting for ilio-caval obstruction has been well described in the literature [8–12]. In our case we used a novel ‘skirt’ technique, in which the main body of the distal IVC was stented first with a single stent, while the IVC confluence is bridged with two simultaneous kissing stents. We think that this ‘skirt’ technique might have additional advantages over double barrels stenting in avoiding oval distortion of the main vessel and facilitate unobstructive laminar flow by maintaining the circular configuration of the vessel lumen.

Fig. 2. Positioning of IVC stent (2B) infrarenally, as guided by IVUS marking of renal vein level (2A), and simultaneous deployment of bilateral iliac stents (2C). IVC: inferior vena cava, IVUS: intravenous ultrasound, RV: renal vein.
Conclusions

In this case of ilio-caval thrombosis with multiple sites of iliac veins compressions causing severe PTS, we demonstrated the versatility of IVUS in diagnosing the underlying pathology, in selection of stents and in guiding of stents landing. We also reported a novel technique in treating a long thrombotic occlusion involving the IVC and the iliac bifurcation.

Ethics information

Not applicable.

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None.

Conflict of interest

The authors have no conflict of interest to disclose.

References