

Mechanical thrombectomy with ClotTriever device in extensive deep vein thrombosis associated with May-Thurner Syndrome

Trombectomía mecánica con dispositivo ClotTriever en trombosis venosa profunda extensa asociada a Síndrome de May-Thurner

Ignacio Manuel Cigalini¹ (ORCID: 0000-0003-1800-2242), Martín Najenson¹, Camila Petry¹, José Fedele², Claudio Manuel Cigalini¹

ABSTRACT

Isolated anticoagulation in deep vein thrombosis associated with May-Thurner syndrome is insufficient, as it results in a high incidence of post-thrombotic syndrome and recurrence of venous thromboembolic disease. This situation has sparked interest in developing various endovascular therapies. We present two cases of extensive deep vein thrombosis associated with May-Thurner syndrome successfully treated with a novel mechanical thrombectomy system.

Keywords: deep vein thrombosis, inferior vena cava, endovascular procedures, thrombectomy.

RESUMEN

La anticoagulación aislada en trombosis venosa profunda asociada al síndrome de May-Thurner resulta insuficiente observándose un gran desarrollo de síndrome post-trombótico y recurrencia de enfermedad tromboembólica venosa. Esta situación ha despertado el interés en el desarrollo de diferentes terapias endovasculares. Presentamos dos casos de trombosis venosa profunda extensa asociados a síndrome de May-Thurner tratados en forma exitosa con un novedoso sistema de trombectomía mecánica.

Palabras clave: trombosis venosa profunda, vena cava inferior, procedimientos endovasculares, trombectomía.

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INTRODUCTION

May-Thurner syndrome (MTS) is a condition characterized by the extrinsic compression of the left common iliac vein by the right common iliac artery and the spine, leading to deep vein thrombosis (DVT)¹. This anatomical variant has been found in more than 20% of the population; however, it is rarely considered in the differential diagnosis of patients with DVT^{1,2}. Anticoagulation alone is insufficient, as it results in a high incidence of post-thrombotic syndrome and the recurrence of venous thromboembolic disease (VTE)^{3,4}. This situation has sparked interest in developing various endovascular therapies. We present two cases of extensive DVT associated with MTS successfully treated with a novel mechanical thrombectomy system.

CLINICAL CASE 1

A 16-year-old male patient who is a Jehovah's Witness, and who had undergone a recent uncomplicated appendectomy as his only relevant medical history, was admitted with a

two-day history of left lower limb pain and swelling following intense physical exercise.

Physical examination revealed tense swelling of the limb up to the groin. Doppler ultrasound confirmed DVT with occlusive thrombotic involvement in the common femoral, femoral, and popliteal veins. A subsequent CT angiography showed MTS associated with proximal thrombotic extension into the inferior vena cava (IVC) (**Figure 1**).

The case was discussed at the site's VTE unit, and the staff decided in favor of an endovascular intervention due to the extensive thrombotic burden and the high risk of sequelae in a young, otherwise healthy patient. Among the available treatment options, a lytic-free system was chosen to minimi-

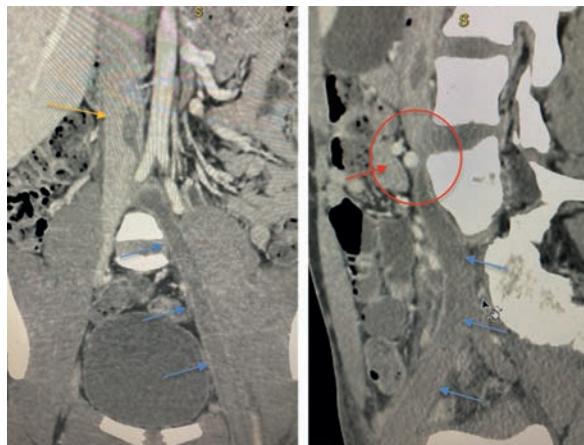


Figure 1. Curved tomographic reconstruction of the left iliofemoral venous axis and the inferior vena cava, showing extensive thrombosis and compression of the left common iliac vein between the right external iliac artery and the spine.

1. Department of Interventional Cardiology and Endovascular Treatment (SCITE) Hospital Privado de Rosario.

2- Department of Hematology Hospital Privado de Rosario.

✉ Corresponding author: Ignacio Manuel Cigalini. Presidente Roca 2440. S2000GAP Rosario, Provincia de Santa Fe, Argentina. imcigalini@gmail.com

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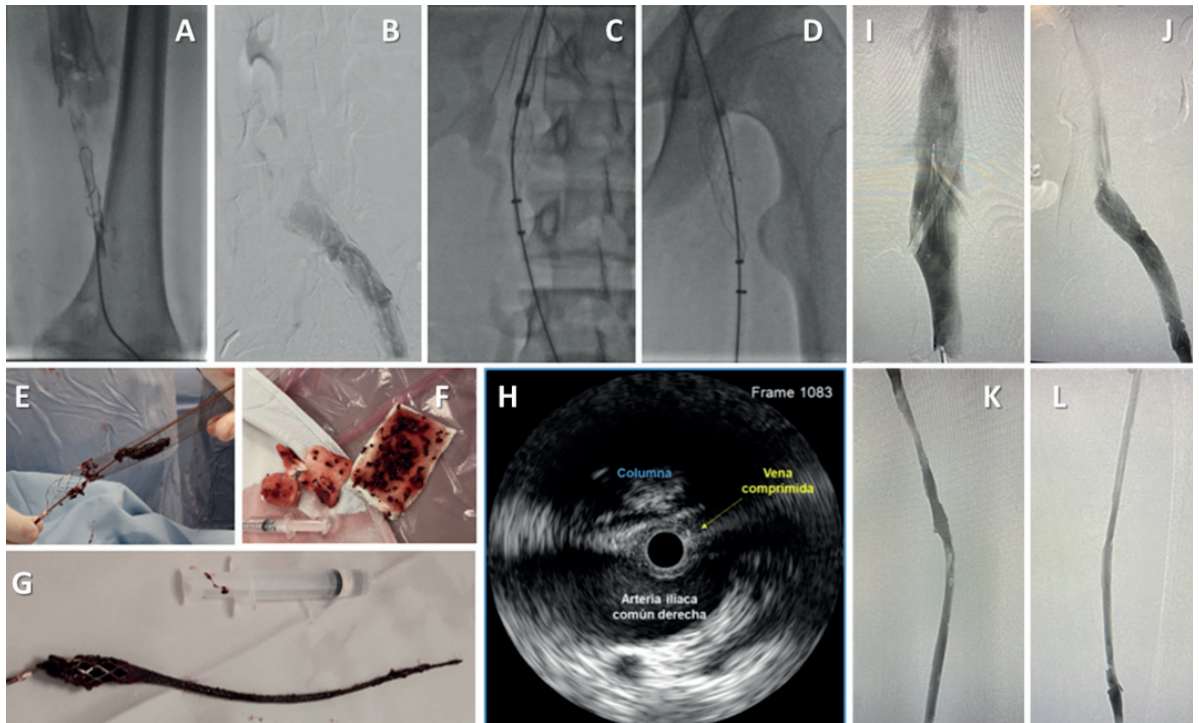


Figure 2. A) Access to the thrombosed popliteal vein. B) Extensive iliofemoral thrombosis and a large thrombus in the inferior vena cava. C) ClotTrierer tunneling, with the coring element deployed in the inferior vena cava outside the introducer and the collection bag deployed within the vein to avoid interaction with the IVC filter. D-G) Mechanical thrombectomy with removal of abundant thrombi. H) Intravascular ultrasound at the compression site. I-L) Final outcome.

ze the bleeding risk and avoid the use of powerful aspiration devices, which could lead to excessive blood loss—all of this taking into consideration the patient's religious beliefs. The ClotTrierer mechanical thrombectomy device (Inari Medical Inc, CA, USA), recently available in Argentina, was the selected alternative.

The procedure was performed under general anesthesia, initially positioning an Option Elite IVC filter (Argon Medical Devices, TX, USA) using a jugular access due to thrombotic involvement in the distal IVC. A 12-Fr \times 70-cm introducer was advanced through the filter using the same jugular access to achieve tunneling for the ClotTrierer, thereby avoiding its interaction with the filter.

The patient was then placed in prone position, and an ultrasound-guided puncture of the completely thrombosed popliteal vein was performed. A 0.035" hydrophilic guidewire was advanced through the thrombi using a 5-Fr vertebral catheter. Once in the IVC, the guidewire was externalized via the jugular introducer to optimize support. Mechanical thrombectomy was then successfully performed by positioning the ClotTrierer coring element in the IVC and deploying the collection bag within the introducer. The device was used four times, modifying the coring element's bevel position at 12, 3, 6, and 9 o'clock. Operators encountered only slight resistance at the compression site, which resolved with the maneuvers (**Figure 2**). After obtaining abundant thrombi, angioplasty was performed with a 16 \times 120-mm self-expanding venous stent (Sinus-Obliquus, Optimed Medizinische Instrumente, Etingen, Germany) guided by intravascular ultrasound (Opticross 0.035", Boston Scientific, MA, USA), following pre-dilation with a 16 \times 60-mm high-pressure balloon (AltoSa-XL PTA, AndraTec Medical Devices, Koblenz, Germany).

Final control demonstrated correct stent positioning and expansion, adequate flow throughout the venous axis without collaterals, thrombi, or residual gradient. The IVC filter was then retrieved without complications.

The patient showed clear clinical improvement and was discharged the day after the intervention with dual antiplatelet therapy with aspirin and clopidogrel. At follow-up, there were no signs or symptoms of post-thrombotic syndrome.

CLINICAL CASE 2

A 54-year-old female on hormone therapy for menopause symptoms, with no other relevant medical history, presented with intense groin and left lower limb pain associated with swelling after a long airplane trip. Doppler ultrasound confirmed DVT in the left common femoral and popliteal veins, and the patient started anticoagulation therapy.

Due to a lack of improvement after one week of treatment, a CT angiography was indicated. It revealed persistent thrombosis in the common femoral vein and the ipsilateral external iliac vein, along with MTS. In this setting, endovascular treatment was agreed upon (**Figure 3**).

The procedure was conducted with the patient in prone position, using a bilateral popliteal access under ultrasound guidance. From the right popliteal access, the FlowTrierer device was advanced, deploying its self-expanding discs in the IVC as an embolic protection device. From the left popliteal access, the thrombosed and stenotic segment was crossed using a 0.035" hydrophilic wire and a 5-Fr catheter. After confirming its position in the IVC, the hydrophilic wire was exchanged for a high-support wire in the innominate vein.

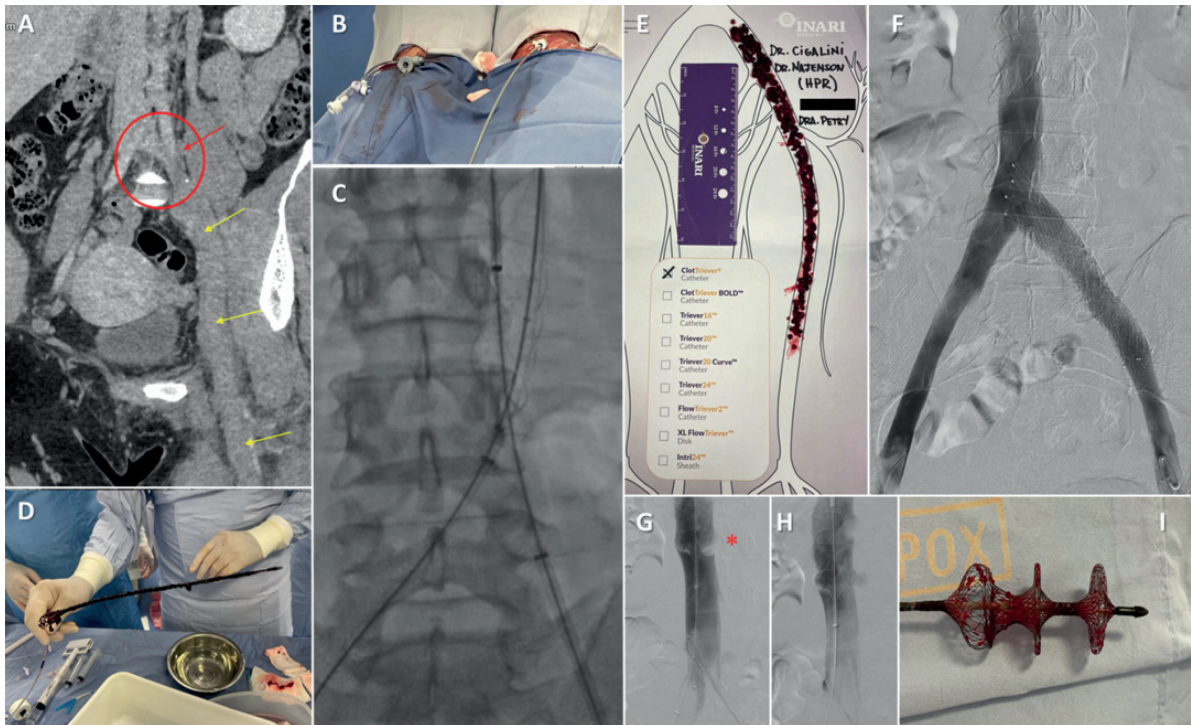


Figure 3. A) CT angiography revealing extensive thrombosis in MTS. B) Bilateral popliteal puncture: left for the thrombectomy with ClotTriever and right for the deployment of embolic protection discs. C) Thrombectomy with the ClotTriever device, with the coring element deployed below the embolic protection discs. D-E) Abundant thrombi extracted. F) Final outcome after implantation of a dedicated self-expanding stent. G-H) Embolization of thrombi (*retained by the embolic protection discs) subsequently aspirated without incidents. I) FlowTriever with retained thrombi.

Mechanical thrombectomy with the ClotTriever device was then performed, using it four times as previously described. It yielded abundant thrombi and restored the flow throughout the venous axis. A new assessment was conducted using intravascular ultrasound with an Opticross 0.035" to optimize results, followed by high-pressure balloon dilation (AltoSa-XL PTA, 16 × 60 mm) at the extrinsic compression site and implantation of a dedicated venous stent (Sinus-Obliquus, 16 × 100 mm).

During the final test, operators confirmed the embolization of a large thrombus retained by the FlowTriever discs in the IVC. Manual thromboaspiration was then conducted with a 10-Fr catheter; the thrombus was successfully removed, and the discs were retrieved with no complications.

The patient had a favorable outcome, with rapid improvement in terms of swelling and pain. She was discharged 24 hours after the procedure on anticoagulation and dual antiplatelet therapy.

DISCUSSION

Increased awareness regarding May-Thurner Syndrome (MTS) as a predisposing factor for deep vein thrombosis (DVT) along with the improved quality of non-invasive imaging techniques have resulted in an increase in diagnosed cases. This has in turn highlighted the need to optimize outcomes through an endovascular approach.

In this sense, the ClotTriever device emerges as an innovative mechanical thrombectomy system. It consists of a self-expanding collection bag and an atraumatic nitinol coring element designed to facilitate the removal of both acute and chronic thrombi in a single session without the need for thrombolysis. This system is combined with an introducer featuring a nitinol self-expanding funnel that ensures wall apposition across the entire vessel, allowing for the safe extraction of thrombotic material.

Based on the good results observed in the Clot registry, which demonstrated excellent patency and a low incidence of post-thrombotic syndrome one year after the intervention⁵, great expectations are placed on the randomized DEFIANC trial (NCT05701917)⁶. This trial aims to compare the performance of the aforementioned device against isolated anticoagulation in patients with iliofemoral DVT.

CONCLUSIONS

MTS should always be considered in patients with DVT, as its management requires endovascular treatment. The ClotTriever thrombectomy device shows great promise, as evidenced in our two cases. It successfully removed significant thrombotic burden, allowing for angioplasty with dedicated stents to be completed in a single session without the use of thrombolysis.

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