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TECHNICAL NOTE

Sharp Recanalization for Chronic Left Iliac Vein Occlusion

Nobutake Ito · Peter Isfort · Tobias Penzkofer · Jochen Grommes · Andreas Greiner · Andreas Mahnken

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Abstract Endovascular treatment has emerged as a first-line treatment for venous occlusions, but is sometimes challenging with conventional approaches. This article describes a helpful technique using a Rösch–Uchida needle to cross a chronic occlusion of the iliac vein when conventional techniques have failed.

Keywords Iliac vein occlusion · Endovascular treatment · Sharp recanalization

Introduction

Obstruction of iliac veins may cause relevant morbidity [1]. The left iliac vein is more commonly affected than the right side, due to underlying nonthrombotic causes, such as May-Thurner syndrome [2]. Recently endovascular treatments, including balloon angioplasty and stenting, are replacing bypass surgery as a primary treatment option because of their less-invasive nature with comparable patency rates [3, 4].

Endovascular treatment, however, can be challenging or even impossible when the obstructive lesion cannot be crossed with a guidewire. We report the case of a 27-year-old woman with chronic occlusion of the left common iliac vein who was successfully treated with sharp recanalization using a Rösch–Uchida needle as bailout technique with subsequent endovenous stenting.

N. Ito · P. Isfort · T. Penzkofer · A. Mahnken
Department of Diagnostic and Interventional Radiology, University Hospital, RWTH Aachen University, 52071 Aachen, Germany

N. Ito (✉)
Helmholtz Institute, Pauwelsstraße 20, 52074 Aachen, Germany
e-mail: nobutake@rad.med.keio.ac.jp

J. Grommes · A. Greiner
Department of Vascular Surgery, University Hospital, RWTH Aachen University, 52074 Aachen, Germany

Case Report

A 27-year-old pyknic woman presented with swelling and severe chronic pain of the left lower extremity, which occurred after she climbing a few stairs. She had a history of left-sided deep venous thrombosis diagnosed 2 years previously, which was treated operatively by thrombectomy. Since then, she has been taking warfarin and using compression therapy. However, she has remained symptomatic ever since and was referred to our hospital for evaluation and further treatment. On laboratory examination there were no signs of a hematological disorder, Lower-extremity Doppler ultrasound was performed and showed stenosis of the left common iliac vein.

Abdomino-pelvic magnetic resonance imaging (MRI) showed complete occlusion of the left common iliac vein, which had decreased to a fine string-like residuum with low signal intensity (Fig. 1). This was thought to be due to extrinsic compression between the right common iliac artery and the body of lumbar vertebra 5. Extensive collateral venous flow by way of lower lumbar vertebral veins was shown, indicating chronic obstruction of the vein. The length of occluded segment was approximately 30 mm. On the basis of those findings, May-Thurner syndrome was considered as the underlying cause of obstruction.

After obtaining informed consent for venography and recanalization, the procedure was performed with the patient under general anesthesia. Because her international

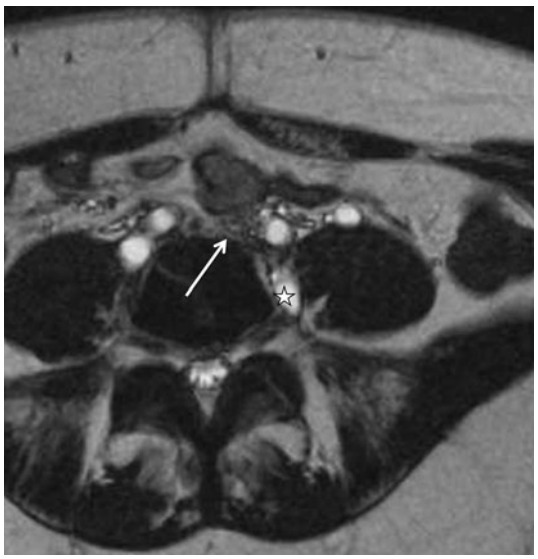

Fig. 1 Axial balanced fast field echo image shows complete occlusion of left common iliac vein. A fine string-like structure of low signal intensity (*arrow*) represents the remnant of the left common iliac vein. Extensive collateral circulation is also seen (*asterisk*)

normalized ratio (INR) was 4.0 the day before surgery, no heparin was administered during the procedure. First, a 7F sheath was placed in the left common femoral vein. Initial left iliac venogram confirmed total occlusion of the left common iliac vein with flow through an enlarged paralumbar venous plexus (Fig. 2A, B). Multiple attempts to traverse the occlusion with various 5F catheters and different guidewires were unsuccessful, mainly because of the preferential passage of wires into the collateral veins (Fig. 2C). After failure of retrograde recanalization, including puncture with the stiff back of the wire, the right common femoral vein was punctured, and a second 5F catheter was advanced into the proximal left iliac vein in a cross-over technique to confirm the position of the patent target vein. However, repeated antegrade attempts for recanalization from right the iliac vein also failed. During those attempts, venography showed a minimum distance of 4 mm between the inferior vena cava (IVC) and the tip of catheter when advanced from a left femoral approach (Fig. 2B).

Considering the patient's young age and severe symptoms, an aggressive strategy of endovascular recanalization was believed to be warranted. The right internal jugular vein was accessed by ultrasound-guided puncture, and by way of a 7F sheath, a snare (Andramed, Reutingen, Germany) with a loop diameter of 25 mm was placed in the inferior vena cava at the level of the iliac bifurcation. Thereafter, the left femoral sheath was exchanged for a 10F Rösch–Uchida sheath (Cook Europe A/S, Bjaeverskov, Denmark). A trocar stylet with a 5F catheter was introduced through the Rösch–Uchida needle and advanced endovenously as close as possible to the snare. After positioning the tip of the stylet at the presumed puncture site, the C-arm was rotated in multiple projections to verify whether the tip of the stylet correctly pointed to the center of the opened snare. Then, the needle that comes in the kit was advanced toward the snare in the IVC (Fig. 3A). After crossing the occlusion and confirmation of a correct intravascular position by contrast injection, a stiff 0.035-inch Amplatz wire (Cook) was inserted, grasped with the snare, and pulled through the sheath into the right jugular vein (through-and-through technique).

Revascularization of the occluded segment was performed by overlapping placement of two self-expandable 16 × 100–mm Sinus-XL stents (OptiMed, Ettlingen, Germany) from the IVC to left external iliac vein, followed by angioplasty with a noncompliant 16 × 40–mm Zelos percutaneous transluminal

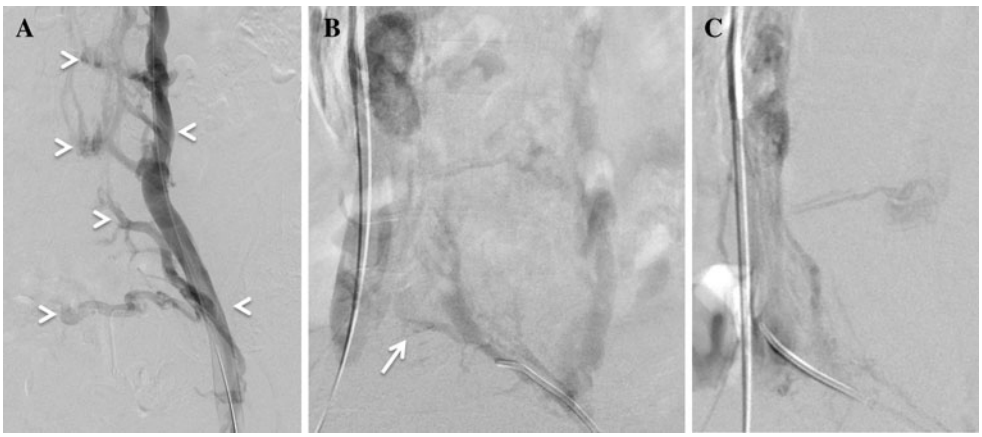

Fig. 2 Initial left iliac venogram shows the total occlusion of the left common iliac vein and extensive paralumbar venous collaterals (**A** [*arrowheads*]). Selective venography by way of a 5F catheter shows the fine venous network in the retroperitoneal space and the occluded venous segment (**B** [*arrow*]). A catheter was advanced to the distal end of the vein. Although the tip was located close to the IVC, no direct connection was seen (**C**)

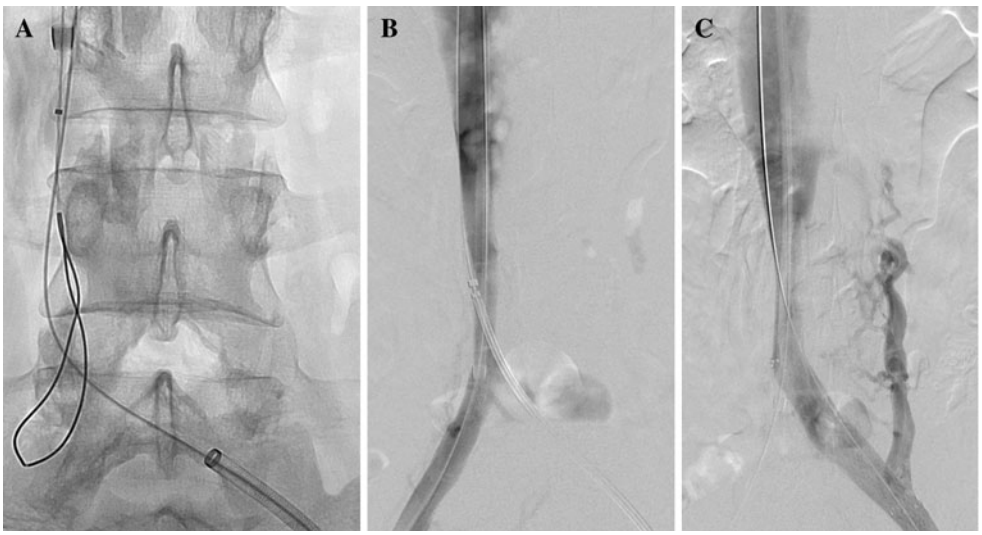

Fig. 3 After verifying needle placement in multiple projections, sharp recanalization was performed, and a guidewire was advanced into the IVC through a snare (**A**). Venography from a right femoral access confirmed the proper position of the wire before stent placement (**B**). Completion venogram after the procedure showed excellent flow in the left iliac vein and markedly decreased collateral flow. No signs of bleeding or residual stenosis were seen (**C**)

angioplasty balloon catheter (OptiMed). Repeated venography was performed during this process to exclude bleeding (Fig. 3B). Finally, patency in the venous left iliac axis was confirmed by venography (Fig. 3C).

The patient experienced rapid and dramatic relief of her symptoms. She was resumed on warfarin with a target INR of 2.5 to 3.5 and discharged on day 2 after the intervention. Follow-up Doppler ultrasound 3 months after the procedure showed proper blood flow in her left lower extremity, and she remained asymptomatic at 4-month follow-up.

Discussion

Sharp recanalization of occluded veins itself is not a new concept. Previous publications have described this approach with various sharp puncturing devices, including the Rösch–Uchida needle, for central venous recanalization [5–9]. The use of the stiff end of standard wires for crossing an occluded segment and balloon catheters and snares as fluoroscopic targets have also been described. To our knowledge, iliac vein recanalization using a Rösch–Uchida needle has not been described before.

Regardless of the recanalization device, one should be aware of potential complications, particularly hemorrhage. Careful preinterventional evaluation with MRI is a safety point as is using a maximally opened snare as a target for the puncture and rotating the C-arm in multiple projections to ensure intravascular location. The Rösch–Uchida needle was used because of its excellent steerability due to the curved guiding sheath. After crossing the occlusion, pull-back venography was performed to exclude extravasation. Finally, the short distance between the inferior vena cava (IVC) and the tip of catheter is the most important consideration, as described previously [1].

Although we assumed that the passage would be made through the retroperitoneal space and a fine collateral vein, we performed postdilatation using a 16-mm balloon with self-expandable stents. Stent placement has been reported to be effective To obtain long-term patency in an iliocaval lesion [10].

We chose a Sinus-XL stent because of its high radial force, which is suitable to overcome external compression. Stent size was adjusted to the normal left external iliac vein. It might be controversial to place a 16-mm stent within retroperitoneal space through a fine collateral vein and the fibrous remnant of a vein. The disadvantage of this idea could be increased risk of hemorrhage immediately after placement and in-stent thrombosis at long-term follow-up. However, the patient has had a dramatic clinical benefit and no symptoms for 4 months. Thus, the stents do not seem to have caused any problems.

As has been reported before, endovascular management of chronic venous occlusion with underlying May-Thurner syndrome is safe and effective. Sharp recanalization with a Rösch–Uchida needle may offer an alternative method when conventional techniques have failed.

Conflict of interest The authors, Nobutake Ito, Peter Isfort, Tobias Penzkofer, Jochen Grommes, Andreas Greiner and Andreas Mahnken, declare that they have no conflict of interest.

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