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CASE REPORTS

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Symptomatic iliofemoral deep venous thrombosis treated with hybrid operative thrombectomy

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During the past 15 years, strategies that promote immediate and complete thrombus removal have gained popularity for the treatment of acute-onset iliofemoral deep venous thrombosis. In this case report, we describe a novel operative approach to venous thrombus removal known as hybrid operative thrombectomy. The technique employs a direct inguinal approach with concomitant retrograde advancement of a balloon catheter by femoral venotomy. Moreover, it provides effective thrombus removal through a single incision, with or without stent placement, and has the advantage of a completion venogram. (J Vasc Surg: Venous and Lym Dis 2015;3:438-41.)

In this report, we describe a novel operative approach for the treatment of iliofemoral deep venous thrombosis (IFDVT) known as hybrid operative thrombectomy (HOT). The technique employs a direct inguinal approach with concomitant retrograde advancement of a balloon catheter by femoral venotomy. Written informed consent was obtained for the publication of this case report and any accompanying images.

CASE

A 58-year-old man presented with pain and swelling throughout the left leg that started 16 days prior and had progressively worsened. His medical history included hypertension, morbid obesity, and sedentary lifestyle. Complete history and physical examination suggested a diagnosis of unprovoked IFDVT of the left leg. Venous duplex ultrasonography found acute thrombus of the common femoral vein (CFV), femoral vein, popliteal vein, and posterior tibial and anterior tibial veins at the left leg. The right leg had normal duplex ultrasound findings. Chest and abdominopelvic computed tomography were negative for occult malignant disease. He was admitted for medical optimization and prescribed a therapeutic dose of low-molecular-weight heparin. He underwent intervention with the HOT technique on day 4 of admission.

Operative course. The procedure was performed under general anesthesia, but spinal or ilioinguinal nerve blocks are acceptable alternatives. The initial incision was made in an oblique fashion for exposure and control of the CFV, femoral vein, saphenofemoral junction, and profunda femoris vein (Fig 1). Flaps were raised at the investing fascia of the thigh, and the dissection proceeded in longitudinal fashion. Double loops were placed at the proximal and distal ends of the dissection. A finder needle was then inserted into the CFV, just above the saphenofemoral junction. Under fluoroscopy, a 10-cm soft-tip hydrophilic guidewire was passed through an angled tapered glide catheter in retrograde fashion, and the valves were manipulated gently down to the tibial veins. The precise location of the wire access depended on the extent and location of the most distal thrombus. A 45-cm 7F sheath was passed over the wire and advanced to the tibial veins. The dilator was then removed, and ascending venography was performed.

Next, the venotomy was extended transversely (approximately 50%) at the CFV, long enough to avoid rupture of the vein when the Fogarty balloon catheter (Baxter Healthcare, Santa Ana, Calif) was passed. The distal thrombectomy was performed with a size 4 Fogarty, which was advanced in a retrograde direction (femoral venotomy to distal vessels) and employed in antegrade fashion under fluoroscopic guidance (Fig 2). Control of the vein was maintained by vessel loops (assistant controlled), and thrombectomy was repeated as many times as necessary. Next, the system was vigorously flushed with a heparinized saline solution to hydraulically remove any remaining thrombus, and completion venography was performed (Fig 3).

The proximal thrombectomy was performed after an iliac and inferior vena cava (IVC) venogram was obtained. If needed,

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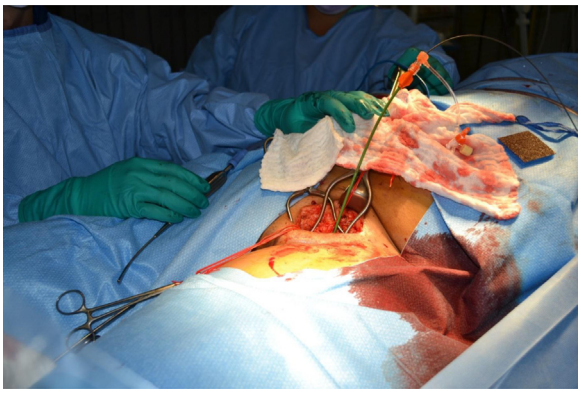

Fig 1. Single incision for exposure and control of the common femoral access point.

intravenous ultrasound could be used to evaluate lesions of the vein and to aid in the decision to place a stent to improve outflow. An 8 F sheath was then passed to the IVC. The sheath was placed for the following reasons: for maintenance and precision of the course directly to the IVC (ie, to avoid lumbar vein cannulation), for improved Fogarty passage through the platelet aggregate cap, and as a time-saving measure. The proximal thrombectomy was performed with a size 7 Fogarty, starting with the iliac segments and finishing with the IVC. Note, because the thrombus extended up to the common iliac vein, the thrombectomy catheter was taken one segment above to the IVC.

Fig 2. Gentle retrograde manipulation of the guidewire down to the tibial vein level with concomitant antegrade thrombectomy. *Segmented arrow*, Antegrade thrombectomy under fluoroscope; *solid arrow*, 4F sheath.

The completion venogram confirmed >95% thrombus resolution with no underlying iliac vein stenosis or recoil. If present, this can be corrected with balloon angioplasty or stent placement, respectively. The venotomy was closed with 6-0 monofilament suture and the incision with multilayer absorbable suture. He was systemically anticoagulated throughout the procedure. The total operative time was 75 minutes, with an estimated blood loss of 600 mL.

Postoperative course. The patient's leg was wrapped with double elastic bandages. Low-molecular-weight heparin and coumadin were initiated at a therapeutic dose, and the patient was transferred to the intensive care unit for close observation. He had significant clinical improvement within the first 24 hours, with decreased pain and significantly reduced swelling. He required no transfusions postoperatively (lowest hemoglobin level reported was 9.2 g/dL). Elastic graded compression stockings (20-30 mm Hg) were initiated before discharge.[1] He was discharged on postoperative day 2 with an international normalized ratio in the therapeutic range. Venous duplex ultrasound (measurement protocol as stated by Wakefield et al) completed 155 days postoperatively showed no acute deep venous thrombosis (DVT) or pathologic venous insufficiency at the surgical limb.[2] At 461 days of follow-up, our patient had a Clinical, Etiologic, Anatomic, and Pathophysiologic score of 0 and a Villalta score of 1, and he was free of pain.

DISCUSSION

Operative thrombectomy is now part of the treatment paradigm for IFDVT and overall has shown good initial clinical results.[3-7] In general, outcomes are improved with appropriate selection of patients and intervention in the acute setting (<14 days).[4-7] Meta-analysis suggests that surgical thrombectomy decreases the incidence of postthrombotic syndrome and venous reflux compared with anticoagulation alone.[7] At the time of intervention, the thrombus was approximately 20 days old. By definition, thrombus becomes subacute by day 21, which increases the likelihood of contraction at the venous segment and adherence to the wall. In our institution, if the thrombus is understood to be >30 days old, the operative thrombectomy is usually not offered. We have performed HOT at this time frame, which resulted in approximately 80% thrombus removal. Therefore, the long-term benefits may be compromised because of inability to accomplish complete thrombus resolution (>95%). We believe that clinical improvement directly relates to the completeness of thrombus resolution in major venous segments (ie, iliofemoral and femoropopliteal).

The technique has several advantages that have translated to good outcomes. First, the operation can be completed through a single incision, which is less than in previously reported contemporary techniques. This has resulted in improved cosmesis for the patient while affording versatile access for thrombectomy. Second, retrograde manipulation allows thrombus removal at more distal segments (ie, femoropopliteal and tibial), which optimizes