

Advances in Operative Thrombectomy for Lower Extremity Venous Thrombosis



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KEYWORDS

• Thrombectomy • Vein • Iliac • Femoral • Venous • Thrombosis • Surgery • Open

KEY POINTS

- Open thrombectomy is considered when thrombus removal is indicated but thrombolysis is contraindicated.
- Open thrombectomy can reduce postthrombotic syndrome and venous reflux versus anticoagulation alone.
- Contemporary operative venous thrombectomy uses a hybrid approach with open thrombectomy for thrombus removal and ilio-caval stenting to treat residual outflow stenosis.

INTRODUCTION: NATURE OF THE PROBLEM

Lower extremity deep venous thrombosis (LEDVT) affects men and women of all ages and is a leading cause of morbidity and mortality in the United States. The mainstay of therapy for acute LEDVT is medical: systemic anticoagulation, leg compression, and early ambulation. Anticoagulation is safe and effective at reducing the rates of pulmonary embolism and recurrent venous thromboembolic events after acute LEDVT. However, anticoagulation does not remove the thrombus and restore venous patency. Residual thrombus can lead to chronic venous obstruction as well as valve dysfunction and reflux. These complications, in turn, cause venous hypertension, which can ultimately lead to the postthrombotic syndrome, a debilitating and costly condition comprising pain, heaviness, edema, varicose veins, hyperpigmentation, inflammation, and ulceration. In a cohort of patients followed after a first episode of deep venous thrombosis (DVT), the cumulative incidence of any postthrombotic syndrome at 5 years was 28.0% and the incidence of severe symptoms was 9.3%.¹

Early thrombus removal, in conjunction with anticoagulation, can restore venous patency, preserve venous valve function, and may reduce the incidence of

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postthrombotic syndrome. The Society for Vascular Surgery (SVS) and the American Venous Forum (AVF) 2012 guidelines² for early thrombus removal in acute LEDVT give the following indications for early thrombus removal:

- First episode of acute iliofemoral DVT
- Symptoms less than 14 days in duration
- Low risk of bleeding
- Limb-threatening venous ischemia (phlegmasia cerulea dolens)
- Patients are ambulatory with
 - Good functional capacity
 - Acceptable life expectancy

Patients with symptoms of greater than 14 days may have inferior results, although the results of the Catheter-Directed Venous Thrombolysis in Acute Iliofemoral Vein Thrombosis (CaVenT) trial suggest that thrombus removal in patients with symptoms less than 21 days is advantageous.^{3,4}

Strategies for early thrombus removal include

- Catheter-based therapies
 - Pharmaco-mechanical (preferred)
 - Pharmacologic
- Open thrombectomy

The SVS-AVF 2012 guidelines recommend catheter-directed therapies over open thrombectomy, as they are less invasive with fewer potential surgical complications.² However, in patients with a contraindication to thrombolytic agents, but who can receive anticoagulation, open thrombectomy should be considered if indications for thrombus removal are met and patients are good operative risks.

SURGICAL TECHNIQUE

Preoperative Planning

The initial diagnosis of iliofemoral LEDVT is clinical, based on the history and physical examination findings of unilateral leg swelling. A thorough history focusing on the duration of symptoms remains important in determining if it has been greater than 14 to 21 days since the onset. Although venous duplex is sensitive and specific for LEDVT, the extent of iliac vein thrombus may be difficult to determine by duplex alone. Computed tomography or magnetic resonance venography should be performed to confirm the diagnosis of iliofemoral thrombosis and determine the extent of thrombus to guide operative thrombectomy. In particular, the extension of thrombosis into the inferior vena cava needs to be evaluated to determine if embolic protection with a filter is needed before thrombectomy.

As soon as the diagnosis of LEDVT is made, appropriate hematologic laboratory testing should be completed and patients should immediately be anticoagulated in the therapeutic range with unfractionated heparin. A blood type and crossmatch should be obtained and available for transfusion if patients are anemic. Intraoperative blood salvage may be considered as well. General anesthesia is preferred, but local anesthesia and sedation can also be used.⁵ A hybrid operative suite with fixed imaging capabilities is desirable, but the procedure can also be performed in a standard operating room with a mobile C-arm with digital subtraction angiography capabilities.

Preparation and Patient Positioning

The patients are placed on a fluoroscopic table that will allow imaging from the feet to the neck. The ipsilateral groin is clipped; the abdomen, both groins, and the

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