Outcomes of Venoplasty with Stent Placement for Chronic Thrombosis of the Iliac and Femoral Veins: Single-Center Experience

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ABSTRACT

Purpose: To assess retrospectively 30-day, 1-year, and 3-year patency of chronically occluded iliofemoral venous thrombotic lesions treated with stent placement in a case series from a single institution.

Materials and Methods: Records of 189 consecutive patients treated by interventional radiology for iliofemoral venous occlusions between March 1, 2003, and December 1, 2008, were retrospectively reviewed. A total of 89 patients (27 men; median age, 46.2 y) with chronic iliac or iliofemoral deep vein thrombosis without involvement of the inferior vena cava met criteria for analysis.

Results: All patients (91 limbs) successfully underwent placement of venous self-expanding stents. Patency rate at discharge was 100%. Following the index procedure, mean pressure gradient across the lesion decreased from 5.63 mm Hg (95% CI, 3.51–7.75) to 0.71 mm Hg (95% CI, 0.08–1.34; $P < .0001$). There were no bleeding complications. Median follow-up was 11.3 months (range, 0.8–72.4 mo). Follow-up at 30 days demonstrated 90 of 91 limbs to be patent. Primary patency rates of treated limbs at 1 and 3 years were 81% and 71%, respectively. Primary patency was lost in 17 cases (19.1%); interventions to maintain or restore stent patency were performed in 13 cases (14.6%). Primary assisted limb patency rates at 1 and 3 years were 94% and 90%, respectively; secondary patency rate was 95%.

Conclusions: Angioplasty with stent placement for treatment of chronically thrombosed iliofemoral veins is a low-risk procedure with acceptable patency rates for as long as 3 years. The outcomes in patients treated in a quaternary referral center are similar to those reported by other centers.

ABBREVIATIONS

DVT = deep vein thrombosis, IVC = inferior vena cava, PTS = postthrombotic syndrome

Postthrombotic syndrome (PTS) is a common complication of deep vein thrombosis (DVT) that is observed in as many as 40% of patients following an episode of DVT. Even when anticoagulant therapy and elastic compression stockings are regularly used, 25% of patients with proximal DVT will develop PTS (1,2). Extensive thrombosis of iliofemoral veins portends a greater than twofold risk of recurrent DVT compared with thrombosis without iliac segment involvement (3). Iliac vein thrombosis will result in disabling venous claudication in a substantial number of patients, and those with thrombosis involving the iliac venous segments are even more prone to developing PTS than patients with thrombus in more distal locations (4–6). Moreover, recurrent, ipsilateral DVT has been shown to be an important predictor of PTS (7), which results in significant disability and worsened quality of life (8). Optimal treatment of iliac

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vein thrombosis to date remains a subject of discussion, as it has not been adequately studied in randomized clinical trials (9) Some DVT cases cannot be recanalized with conservative treatment and end up as chronic occlusions, contributing to the prevalence of PTS.

To reestablish venous patency, placement of stents is now performed to recanalize chronically occluded iliac and common femoral veins (5,10,11). Among possible clinical benefits may be decreased incidence and severity of PTS (5,12). Although the cumulative experience of iliofemoral venous stent placement continues to increase, our quaternary referral center routinely sees many complex cases. It was assumed that, even in these difficult cases of chronic venous thrombosis, endovascular stents can offer meaningful benefits. The purpose of this study was to retrospectively assess 30-day, 1-year, and 3-year patency of chronically occluded iliac and femoral venous thrombotic lesions treated with stent placement in a case series from a single institution. Considering that many of our patients are referred after it is believed treatment options are exhausted, we were interested to compare patency rates in our institution versus those reported by other authors.

MATERIALS AND METHODS

Patient Selection

The study was approved by the Mayo Clinic Institutional Review Board. Consecutive cases of technically successful recanalization of chronically thrombosed iliac and femoral veins from March 1, 2003, through December 1, 2008, were identified through review of the vascular and interventional radiology database (Hi-iQ; ConexSys, Lincoln, Rhode Island). Key inclusion criteria were age greater than 18 years and confirmed uni- or bilateral iliac or iliofemoral thrombotic occlusions of more than 30 days duration treated with percutaneous iliac or iliofemoral venous stents. Only patients who underwent successful recanalization procedure were included. With the methods described here, we had no ability to capture the scale and number of unsuccessful cases. The index procedure was angioplasty and stent placement in the chronically thrombosed iliac veins and/or common femoral veins performed at our institution regardless of the duration of symptoms, time from initial diagnosis, or previous attempts at recanalization. Excluded were cases of acute thrombosis (except for acute-on-chronic cases of previously diagnosed iliac vein thrombosis) and cases involving inferior vena cava (IVC) occlusions, extrinsic compression by a tumor or aneurysm, retroperitoneal fibrosis, or polycystic liver disease, as many of these cases have additional etiologic factors that are different from the more common lower-extremity DVT cases, and likely a different natural history. In addition, cases that required combined surgical and endovascular approach or encompassing earlier stent placement at outside institutions were excluded, as the focus of this study was to evaluate the primary endovascular approach. Finally, cases without at least one follow-up with lumen patency assessment by venography or ultrasound (US) were also excluded.

All patients were routinely scheduled for follow-up at 3 months, 6 months, 12 months, and annually thereafter (emergently if acute loss of patency was suspected). Follow-up consisted of patency assessment of the treated veins by US or venography, clinical evaluation, and, in select cases, strain-gauge venous plethysmography. Patients were followed for the maximum time length possible until 2011. Patency data were based on the results of imaging studies (US or venography).

Data Abstraction

Data were abstracted from the medical records by three independent abstractors (A.K.K., H.B., and S.M.M.) who reviewed procedural, imaging, and laboratory reports and clinical notes from vascular physicians and other specialists. Records were analyzed for clinical descriptors, such as pain, edema, and stasis ulcers. Noninvasive vascular laboratory data, including exercise and outflow venous plethysmography, passive drainage and refill, and continuous-wave Doppler readings were abstracted from vascular laboratory reports. Procedural characteristics such as stent details, approaches, specific techniques, and anatomic descriptors were analyzed. Records were reviewed for comorbidities such as cancer or hypercoagulable status and for periprocedural placement of IVC filters. When only the month of the initial diagnosis or symptom onset was known, the date was entered as the first day of that month; for remote cases in which only the year was recalled by the patient, the date was recorded as January 1 of that year. When transduced pressures were documented as a fluctuation between two adjacent numbers, the lower numbers for both pre- and postprocedural gradients was used. All questionable cases were reviewed collectively.

Procedure

The procedure was performed with local anesthesia and intravenous sedation and via right internal jugular vein or ipsilateral common femoral vein access. Pressure gradient between the IVC and the distal open vein was measured when possible and as soon as the occlusion had been traversed. The tract was predilated by using a 12- or 14-mm balloon. An effort was made to cover the entire diseased iliac and common femoral venous segment with stents. In most cases, 14-mm-diameter stents were used, but a few patients had smaller and/or larger stents placed at the operator's discretion. In the central common iliac vein, the stents were extended approximately 1 cm into the IVC bifurcation, but avoiding coverage of the contralateral iliac vein ostium. The stents were then dilated by using the same diameter balloon, and venography was repeated. Finally, pressure measurements were obtained between the IVC bifurcation and the distal end of the stent-implanted segment.

During the procedure, the patients underwent full an-