Table. Outcome of thrombophilia testing in patients without strong provoking factors for venous thromboembolism (VTE)

Thrombophilia type	Patients tested for thrombophilia (n = 138), No. (%)
Thrombophilia negative	79 (57)
Inherited	30 (22)
Factor V Leiden	22 (16)
Prothrombin gene mutation	0 (0)
Protein C	2 (1)
Protein S	2 (1)
Antithrombin	4 (3)
Acquired (antiphospholipid antibody syndrome)	29 (21)

patency was assessed using duplex ultrasound 24 hours, 2 weeks, 6 weeks, 3 months, 6 months,1 year, and yearly after intervention. Reinterventions were performed when there was a reduction in stent diameter of >50% or occlusion.

Results: Of 205 patients treated, 138 (67%) were tested for thrombophilia, of which 59 of 138 (43%) had an inherited (30/59 [51%]) or acquired (29 [49%]) thrombophilia (Table). Cumulative patency was 88% in patients with thrombophilia and 89% in patients without (median follow-up, 1.7 years; range, 52-258 weeks). In addition, 64 of 138 (46%) patients required reintervention to maintain patency, of which 28 of 59 (47%) occurred in patients with thrombophilia and 36 of 79 (45%) in patients without. Inherited or acquired thrombophilia was not associated with cumulative patency loss ($P = .402$) or higher risk of reintervention ($P = .255$).

Conclusions: Thrombophilia assessment for APS should be performed in patients undergoing iliofemoral venous stenting without strong provoking factors for VTE as prolonged anticoagulation with VKAs is advised in this group of patients because of their increased risk of VTE recurrence. Furthermore, patients with inherited or acquired thrombophilia should not be excluded from iliofemoral venous stenting as patency outcomes are good in conjunction with appropriate postoperative anticoagulation therapy.

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Single- Versus Multiple-Stage Catheter-Directed Thrombolysis Does not Affect Iliac Vein Stent Length or Patency Rates

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Objective: Incomplete venous thrombolysis and residual nonstented iliac vein disease are known predictors of recurrent deep venous thrombosis (DVT). Controversy exists as to whether the number of thrombolysis sessions affects total stent treatment length or stent patency. The goal of this study was to evaluate the outcomes of patients who underwent single vs multiple catheter-directed lysis sessions with regard to stent extent and patency.

Methods: Consecutive patients who underwent thrombolysis and stenting for acute iliofemoral DVT between 2007 and 2018 were identified and divided into two groups based on number of treatments performed (one vs multiple sessions). Operative notes and venograms were reviewed to determine the number of lytic sessions performed and stent information including size, location, total number, and length treated. End points include total stented length and 30-day and long-term outcomes. The χ^2 comparisons, logistic regression, and survival analysis were used to determine outcomes.

Results: Seventy-nine patients underwent lysis and stenting (6 bilateral interventions; mean age, 45.9 ± 17 years; 48 female). Ten patients (12 limbs) underwent single-stage treatment with pharmacomechanical thrombolysis and the remaining 69 (73 limbs) two to four treatments combining pharmacomechanical thrombolysis and catheter-directed lysis. Patients who underwent a single-stage procedure were older and more likely to have a malignant neoplasm. These patients also received less tissue plasminogen activator compared with the multiple-stage group (17.2 ± 7.0 mg vs 27.3 ± 11.7 mg; $P = .010$). Average stent length was 8.8 ± 5.2 cm for the single-stage group vs 9.2 ± 4.6 cm for the multiple-stage group ($P = .764$). In dividing patients into one or two treatments (52 patients) vs three or four (27 patients), there was no significant difference in total stent length ($P = .489$). Patients who underwent a single-stage procedure had no difference in average length of stay than those who underwent multiple sessions (8.5 days vs 5.9 days; $P = .269$). The overall 30-day rethrombosis rate was 14.8%. Three-year patency was 72.2% and 74.8% for the single and multiple stages; respectively. The major predictor for loss of primary patency was incomplete lysis (hazard ratio, 7.69; $P < 0.01$) but not number of procedures (hazard ratio, 1.01; $P = .994$). The overall rate of post-thrombotic syndrome (Villalta score ≥5) was 9.3% at 5 years.

Conclusions: Single- vs multiple-stage thrombolysis for DVT is not associated with a difference in extent of stent coverage. Patency rates remain high for iliac stenting irrespective of the number of lytic sessions, provided lysis is complete and the diseased segments are appropriately stented. Preoperative factors including the patient's age and comorbidities may contribute to the decision to proceed with single vs multiple lysis sessions and deserve further investigation.

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In-Stent Restenosis After Iliocaval Stenting—Characteristics and Outcomes

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Objective: With increasing use of iliocaval stenting, complications of such stenting have also become more common. In-stent restenosis (ISR), an outcome that is responsible for a majority of reinterventions, is one that has not been studied in detail. Characteristics of ISR in addition to outcomes after reintervention are evaluated.

Methods: A retrospective review of contemporaneously entered electronic medical record data on 372 limbs with initial unilateral iliocaval stents (247 left and 125 right) placed during a 3-year period from 2015 to 2017 was performed. ISR was estimated from stent and flow channel diameters measured using duplex ultrasound. Characteristics evaluated included onset of ISR after stent placement and progression over time. Regression analysis was performed to evaluate risk factors for development of ISR. Outcomes after reintervention for ISR were also appraised. Kaplan-Meier analysis was used to assess stent patency afater intervention; paired *t*-test was used to examine preintervention and postintervention outcomes.

Results: There were 361 limbs that underwent stenting for stenotic lesions, whereas 11 underwent stenting for chronic native vein occlusions. ISR was noted as early as postintervention day 1. It progressed to a maximal value by 6 months and stabilized thereafter. The overall median ISR across stented common femoral, external iliac, and common iliac segments at 12 months was 43.75%. The segment most commonly affected by ISR was the external iliac vein (77.5%). Up to 89% of stents can have some degree of ISR at 12 months. Variables evaluated as predictors for ISR included age, sex, thrombophilia, thrombotic or nonthrombotic lesion, inflow, stent compression, shear rate, and flow rate. Of these, only lack of stent compression was a significant predictor of ISR at 6 and 12 months. During a median follow-up of 13 months, 50 of 372 (13%) limbs underwent reintervention for ISR and 12 (3%) underwent reintervention for stent occlusion (8 acute [<30 days] and 4 chronic [>30 days]). After reintervention, the Venous Clinical Severity Score improved from 6 to 4 for the ISR cohort ($P < .001$). Median primary, primary assisted, and secondary patencies after reintervention for ISR were 37, 38, and 17 months, respectively.

Conclusions: ISR occurs early after iliocaval stenting but stabilizes around 6 months. Progression of ISR to stent occlusion is rare. No statistically significant, modifiable predictor for ISR was noted. After reintervention for ISR, good clinical outcomes and stent patencies can be expected.