

Outcomes of Pharmacomechanical Catheter-directed Thrombolysis for Acute and Subacute Inferior Vena Cava Thrombosis: A Retrospective Evaluation in a Single Institution

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WHAT THIS PAPER ADDS

Pharmacomechanical catheter-directed thrombolysis (PCDT) has been confirmed as an effective method of treating iliofemoral venous thrombosis, which reduces the prevalence of severe post-thrombotic syndrome in long-term follow-up. However, to date, few cases with thrombosis of inferior vena cava (IVC) have been treated with this procedure. This retrospective study adds to the existing information regarding the procedure of PCDT in managing symptomatic acute and subacute IVC thrombosis.

Objective/Background: The objective was to assess the mid-term results of pharmacomechanical catheter-directed thrombolysis (PCDT) for symptomatic acute and subacute inferior vena cava (IVC) thrombosis; the risk factors of early thrombosis recurrence and iliocaval patency were also evaluated.

Methods: From January 2010 to December 2015, 54 patients (33 men; mean age 47.1 years) with symptomatic acute and subacute IVC thrombosis were treated with PCDT. Primary technical success (clot lysis $\geq 50\%$ after PCDT), stent-assisted technical success (residual stenosis $< 30\%$ after stenting), clinical success (freedom from thrombosis recurrence within 30 days), complications, frequency of post-thrombotic syndrome (PTS; Villalta score ≥ 5), and iliocaval patency were recorded at follow-up evaluation. A multivariate regression model was used to determine predictors of early thrombosis reoccurrence and iliocaval patency.

Results: The primary technical success and the stent-assisted technical success were 63% ($n = 34/54$) and 100% ($n = 54/54$) respectively. There were 11 patients (20%) with immediate recurrent thrombosis requiring repeat PCDT. Minor bleeding complications occurred in seven patients, and one patient with major bleeding needed a blood transfusion. The occurrence of PTS at a mean of 26 months (range 1–60 months) was 13% (7/54). The 3-year primary and secondary iliocaval patency was 63% and 81%, respectively. On multivariate analysis, active malignancy was predictive of immediate IVC thrombosis recurrence (hazard ratio [HR] 5.8, 95% confidence interval [CI] 1.7–19.8; $p = .01$), whereas the pre-existing filter played a protective role against iliocaval re-occlusion (HR 0.3, 95% CI 0.1–0.8; $p = .01$).

Conclusions: PCDT is safe and effective in managing symptomatic acute and subacute IVC thrombosis. Active malignancy is predictor of thrombosis re-occurrence, whereas the presence of a filter is associated with a higher rate of iliocaval patency at mid-term follow-up.

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INTRODUCTION

Although anticoagulation is the mainstay treatment for deep venous thrombosis (DVT) and can prevent thrombus extension, pulmonary embolism (PE), and thrombosis recurrence, but has no direct thrombolytic effect,

approximately half of patients with DVT with iliofemoral involvement develop post-thrombotic syndrome (PTS).¹ Current trends in vascular intervention advocate for more aggressive management of iliofemoral DVTs with enhanced endovascular clot removal; the aim is to relieve acute symptoms and prevent long-term post-thrombotic complications.^{2–4} Recently, guidelines from the Society for Vascular Surgery and American College of Chest Physicians both suggest that the use of early thrombus removal strategies in selected iliofemoral venous thromboses protects against the late manifestation of PTS.^{5,6} Patients with IVC thrombosis have a massive thrombus burden and are at a

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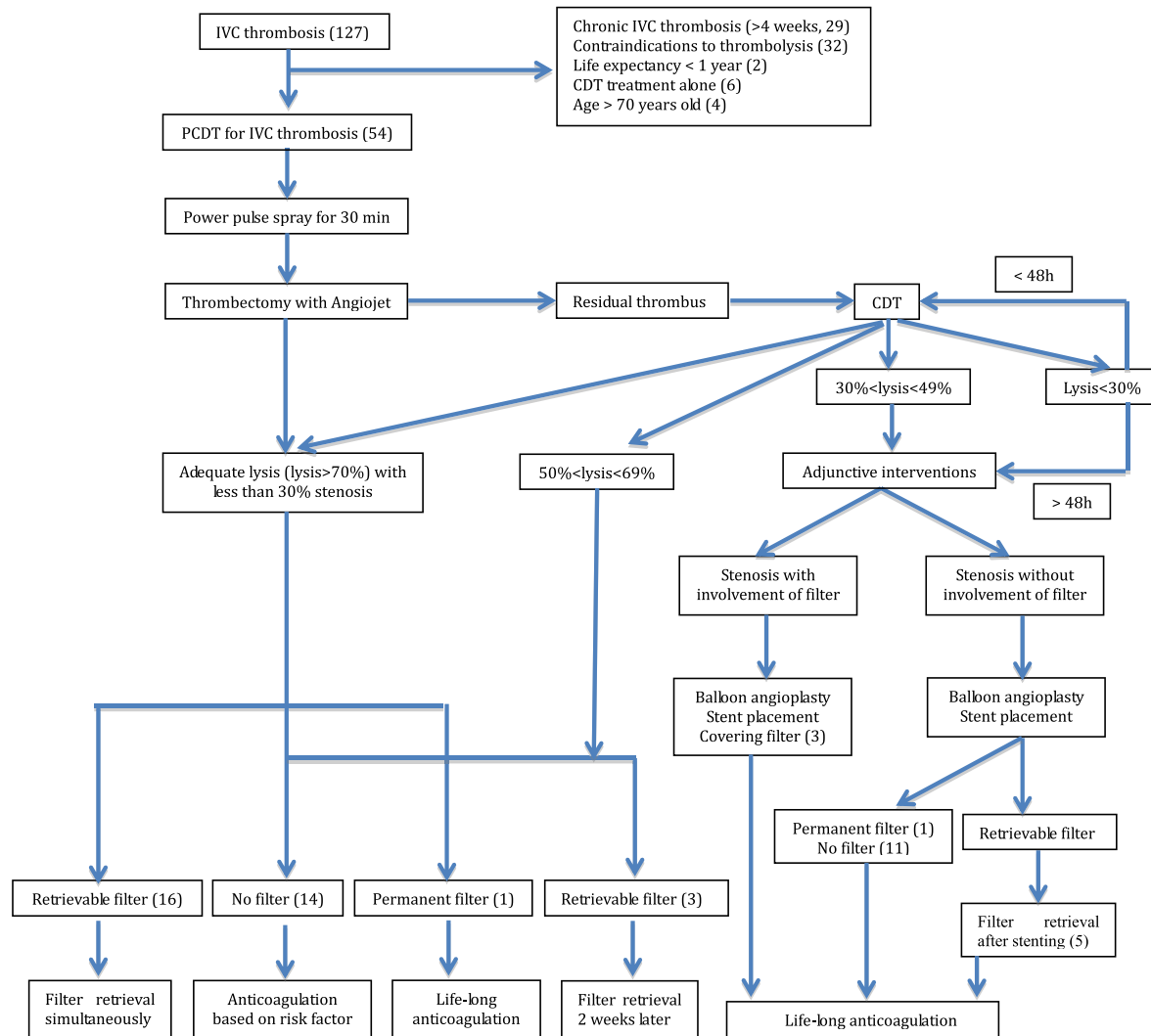


Figure 1. Treatment algorithm for patients with acute and subacute inferior vena cava (IVC) thrombosis. *Note.* CDT = catheter-directed thrombolysis; PCDT = pharmacomechanical catheter-directed thrombolysis.

significantly higher risk of developing disabling PTS.⁷ Unfortunately, few guidelines referred to the use of thrombus removal in patients with IVC thrombosis. This study aimed to assess the mid-term outcomes of pharmacomechanical catheter-directed thrombolysis (PCDT) for acute and subacute IVC thrombosis, and to evaluate the risk factors for early failure and ilio caval patency.

MATERIALS AND METHODS

A prospectively maintained registry of all patients with symptomatic acute (the duration from symptom onset to treatment was within 2 weeks) and subacute (between 2 and 4 weeks) IVC thrombosis treated with PCDT between January 2010 and December 2015 was retrospectively reviewed. The records were reviewed for perioperative data, demographics, risk factors of IVC thrombosis, and involvement of thrombosis. The details of intervention, including adjunctive balloon angioplasty and stent placement, were also recorded. Technical success, clinical success, periprocedural complications, immediate results of thrombolysis, follow-up imaging findings, Villalta scores, and

ilio caval patency were reviewed.⁸ The study protocol was reviewed and approved by the hospital's institutional review board. All patients gave informed consent to undergo the procedures listed.

IVC thromboses were diagnosed by computed tomography (CT) venography and were confirmed by catheter venography during the PCDT procedure. In all patients, anticoagulation was started with subcutaneous low-molecular-weight heparin (80–100 IU/kg nadroparin [Fraxiparine, GlaxoSmithKline, Brentford, UK]) per 12 hours, and was reintroduced in combination with warfarin on the same day after completion of PCDT.

Endovascular thrombus removal

Details of the PCDT procedure have been reported previously.⁹ Briefly, under local anesthesia, with the guidance of ultrasound, a percutaneous 6-F sheath was placed in an antegrade fashion into the popliteal or femoral vein when there was IVC thrombosis with involvement of the ipsilateral limb, or two sheaths were inserted into bilateral popliteal veins or femoral veins in bilaterally diseased limbs.

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