

Endovascular Thrombolysis in the Management of Iliofemoral Thrombosis in Children: A Multi-Institutional Experience

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ABSTRACT

Purpose: To evaluate technical feasibility, complications, and clinical outcomes of endovascular thrombolysis for iliofemoral thrombosis at two tertiary-care children's hospitals.

Materials and Methods: Institutional review board–approved retrospective review from March 2003 through June 2013 showed that venous thrombolysis for iliofemoral thrombosis was performed in 57 children (64 limbs) with a median age of 16.1 years (mean age, 14.5 y; range, 1.0–17.8 y). Techniques included catheter-directed thrombolysis (CDT), percutaneous mechanical thrombectomy (PMT), and pharmacomechanical catheter-directed thrombolysis (PCDT) with adjunctive angioplasty and/or stent placement. Villalta and modified Villalta scales were applied retrospectively to follow-up data to assess postthrombotic syndrome (PTS).

Results: Technical success ($\geq 50\%$ thrombolysis) rate was 93.7%: grade III (100%) in 19 limbs, grade II (50%–99%) in 41 limbs, and grade I ($< 50\%$) in four limbs. Techniques included CDT with PCDT (32.8%) or PMT (35.9%), CDT alone (26.6%), PCDT alone (4.7%) or with adjunctive angioplasty (54.7%), and stent placement (6.3%). Mean duration of CDT was 36.5 hours (range, 2.9–89.6 h). There was one major complication (1.8%) of bleeding requiring transfusion. Minor complications (ie, bleeding) occurred in seven patients (12.2%). Median follow-up was 1.5 years (range, 30 d to 7 y). Seven patients underwent repeat thrombolysis for recurrent thrombosis. The PTS rate was 59.3% per modified Villalta scale but only 2.1% per Villalta scale.

Conclusions: Endovascular thrombolysis is technically feasible and safe for iliofemoral thrombosis in children. Variable results were seen with two scales to assess PTS, suggesting an acute need for standardization of outcome measurement in children.

ABBREVIATIONS

CDT = catheter-directed thrombolysis, PCDT = pharmacomechanical catheter-directed thrombolysis, PMT = percutaneous mechanical thrombectomy, PTS = postthrombotic syndrome

Iliofemoral thrombosis is associated with severe post-thrombotic syndrome (PTS) secondary to chronic

insufficiency of the lower-extremity venous system (1). The use of thrombolysis for lower-extremity deep vein thrombosis (DVT) in adults has demonstrated earlier achievement of venous patency, resulting in lower rates of PTS compared with the use of oral anticoagulation alone (2,3). These promising results have encouraged the use of site-directed thrombolysis in children. However, the treatment guidelines for children are extrapolated from those for adults and from small pediatric case series. Limited data exist regarding the safety and efficacy of these techniques in the pediatric population (4). Recent pediatric case series have demonstrated feasibility and safety of site-directed thrombolysis in the treatment of proximal upper- and lower-extremity thrombosis in children (5–7). The present study retrospectively evaluated

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the experiences of two large pediatric institutions (henceforth institutions A and B) with the use of site-directed thrombolysis in the management of proximal iliofemoral thrombosis in children. We describe the technical success of thrombolysis, associated complication rates, and the rate of PTS in this population.

MATERIALS AND METHODS

Following approval by the institutional review board at each institution, a retrospective review of the interventional radiology database was performed to identify all patients who had received site-directed therapy for iliofemoral thrombosis, including catheter-directed thrombolysis (CDT) alone or in conjunction with percutaneous mechanical thrombectomy (PMT) or pharmacomechanical catheter-directed thrombolysis (PCDT) for iliofemoral DVT between March 2003 and July 2013. Medical and imaging databases were reviewed for relevant clinical and procedural data.

A total of 57 children (64 limbs) underwent thrombolytic therapy at the two institutions during the study period (Fig). Patient demographics and clinical presentations are summarized in Tables 1 and 2. A more specific review of patient records was performed for identification of risk factors for thrombosis at the time of presentation, which is presented in Table 3. Inclusion and exclusion criteria for thrombolytic therapy were previously described by Raffini (4) and Kukreja et al (8).

In brief, patients with symptomatic lower-extremity DVT of iliofemoral veins confirmed by ultrasound (US) were included. Important exclusion criteria were major surgery or trauma within 10 days, cerebrovascular infarction or hemorrhage within 2 months, pregnancy or

Table 1 . Characteristics of Study Population

Characteristic	Value
No. of patients	57
Sex	
Male	26
Female	31
Patient age (y)	
Median	16.1
Mean	14.5
Range	1.0–17.8
Age group	
1–5 y	2
5–10 y	6
10–15 y	9
15–18 y	40
Patient weight (kg)	
Median	66.2
Range	9.4–132.4
Ethnicity	
White	40
Black	13
Other	4

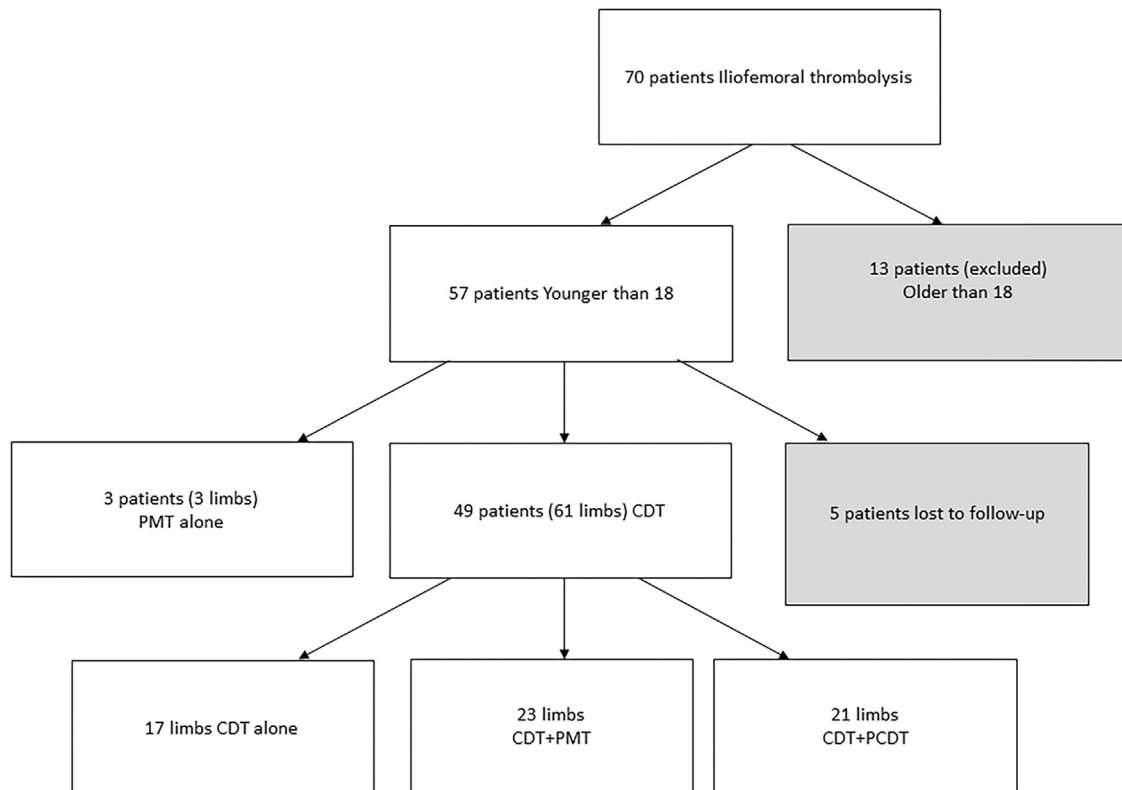


Figure. Flowchart of the patient population included in the study.

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