

# Mechanical thrombectomy for the management of iliofemoral deep venous thrombosis in the second trimester of pregnancy secondary to May-Thurner syndrome

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## ABSTRACT

Treatment of pregnancy-related venous thromboembolism is limited by considerations of the health risks to both the patient and fetus. Anticoagulation is the cornerstone treatment for pregnancy-related venous thromboembolism; however, early thrombus removal may be preferred for prompt symptom resolution and to decrease the risk of post-thrombotic syndrome. We report the successful treatment of a patient in the second trimester of pregnancy with symptomatic iliofemoral deep venous thrombosis and May-Thurner syndrome using percutaneous mechanical thrombectomy. (J Vasc Surg Cases Innov Tech 2024;10:101609.)

**Keywords:** Deep venous thrombosis; Mechanical thrombectomy; May-Thurner syndrome; Pregnancy

Pregnancy is a well-established risk factor for venous thromboembolism (VTE) owing to physiological changes, including hypercoagulability, venous stasis, and vascular compression by the growing uterus.<sup>1,2</sup> Compared with nonpregnant patients, pregnant patients have an increased risk of developing VTE<sup>3,4</sup> and experiencing recurrent thrombotic events.<sup>5</sup> Pregnancy-related VTE increases the risk of obstetric complications and maternal mortality; pulmonary embolism is among the leading causes of pregnancy-related mortality in the United States.<sup>6</sup> Optimizing VTE management is, therefore, highly important for pregnant patients. However, treatment options are limited by considerations for the health of the fetus, making therapies involving radiation and thrombolytic agents relatively contraindicated. Anticoagulation with low-molecular-weight heparin is the first-line treatment for pregnancy-related VTE,<sup>7,8</sup> with thrombolytics indicated only in cases of acute PE and life-threatening hemodynamic instability.<sup>7</sup> Current guidelines advise against more aggressive treatments for deep vein thrombosis (DVT) such as catheter-directed thrombolysis; however, a subset of patients may benefit from early thrombus removal, suggesting a need to investigate treatment modalities that can provide this benefit. In this report, we describe the successful management of acute iliofemoral DVT in a pregnant

patient at 25 weeks gestation via percutaneous mechanical thrombectomy followed by venoplasty and stenting. The patient gave her consent for this case report.

## CASE REPORT

The patient was a 30-year-old pregnant woman, gravida 1 para 0, at 25 weeks gestation with a history of polycystic ovarian syndrome who presented to the emergency department with a 1-week history of left lower extremity swelling and pain limiting her ability to ambulate (Fig 1). She had no history of prior VTE or any prolonged immobility leading up to the development of her symptoms. However, she did note a family history of DVT. Lower extremity duplex examination demonstrated acute DVT of the common and deep femoral veins extending into the left external iliac vein (Figs 2 and 3). Vascular surgery was asked to evaluate the patient and she was started on a therapeutic heparin drip. After 48 hours of management with heparin, although no phlegmasia was noted, the degree of impairment in mobility and the severity of pain and swelling prompted consideration of early thrombus removal. After extensive conversation with the obstetrics and gynecology team about the risks of surgery and radiation to the fetus, the decision was made to offer percutaneous mechanical thrombectomy given the severity of her symptoms.

**Procedural details.** The patient was placed in the supine position for the procedure. Under ultrasound (US)-guidance, the popliteal vein was accessed with the leg in frog-leg position. Intravascular US (IVUS) demonstrated extensive thrombus extending from the left mid femoral vein to the left common iliac vein (Figs 4 and 5). Percutaneous mechanical thrombectomy of the left femoral and common iliac veins was performed using the Inari ClotTrieve system (Inari Medical, Irvine, CA) under fluoroscopic guidance. Four sequential passes were made for retrieval of the acute and chronic thrombus. Venogram confirmed good flow but demonstrated venous compression at the level of the iliac vein. IVUS demonstrated May-Thurner syndrome with compression of the left iliac vein by the right common iliac artery. To relieve the compression, the common iliac vein was ballooned (14 mm) and stented with 16 mm ×

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**Fig 1.** Evidence of swelling and discoloration of the affected leg prior to initial hospitalization.

80 mm Venovo stent (BD Medical, Franklin Lakes, NJ). On completion venogram, there was brisk flow through the stent and no residual thrombus (Fig 5). The total radiation exposure was 50 mCy, significantly lower than previously reported in pharmacomechanical thrombectomy for iliofemoral DVT,<sup>9</sup> and within the range generally considered safe for a fetus in the second and third trimesters of pregnancy.<sup>10</sup> A lead apron was used throughout to minimize fetal radiation exposure. The obstetrics and gynecology team was involved with monitoring the fetus during the procedure; following their recommendation, nonstress testing was done immediately before and after the procedure.

Postoperatively, the patient was started on aspirin and transitioned from heparin drip to enoxaparin sodium (Lovenox) for discharge, at 1 mg/kg twice daily for 6 weeks. Her pain and swelling improved significantly and she was discharged on postoperative day 1. The remainder of her pregnancy was uneventful. She had a spontaneous labor and delivered a healthy baby without complications.

At 3 months postpartum, she had an outpatient vascular follow-up, at which point venous duplex examination demonstrated a patent stent and no residual thrombus. Her symptoms resolved fully and she was instructed to continue aspirin therapy. She continues to do well at 1 year.

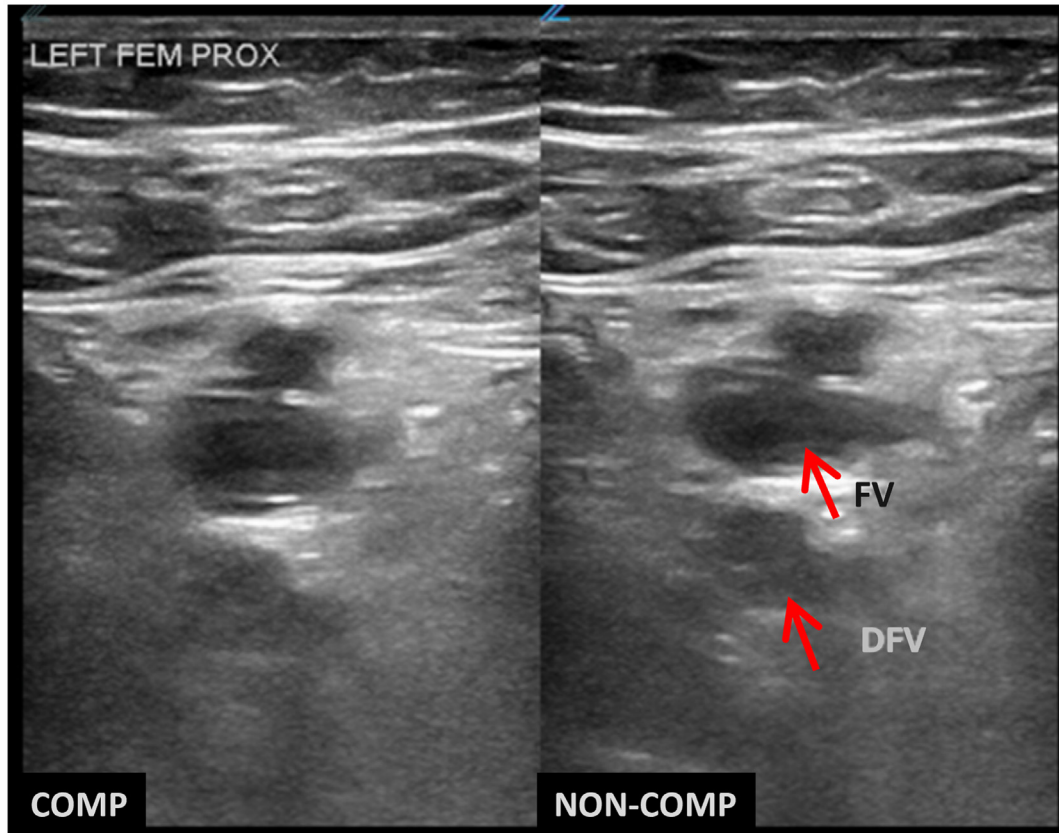
## DISCUSSION

Management of DVT in pregnant patients requires special consideration of the risks to both the patient and fetus. Anticoagulation with low-molecular-weight heparin has proven to be both safe and effective in pregnancy<sup>11</sup> and is the treatment of choice for acute DVT in the peripartum and postpartum periods.<sup>7,8</sup> However, anticoagulation only limits thrombus extension without decreasing thrombus burden.

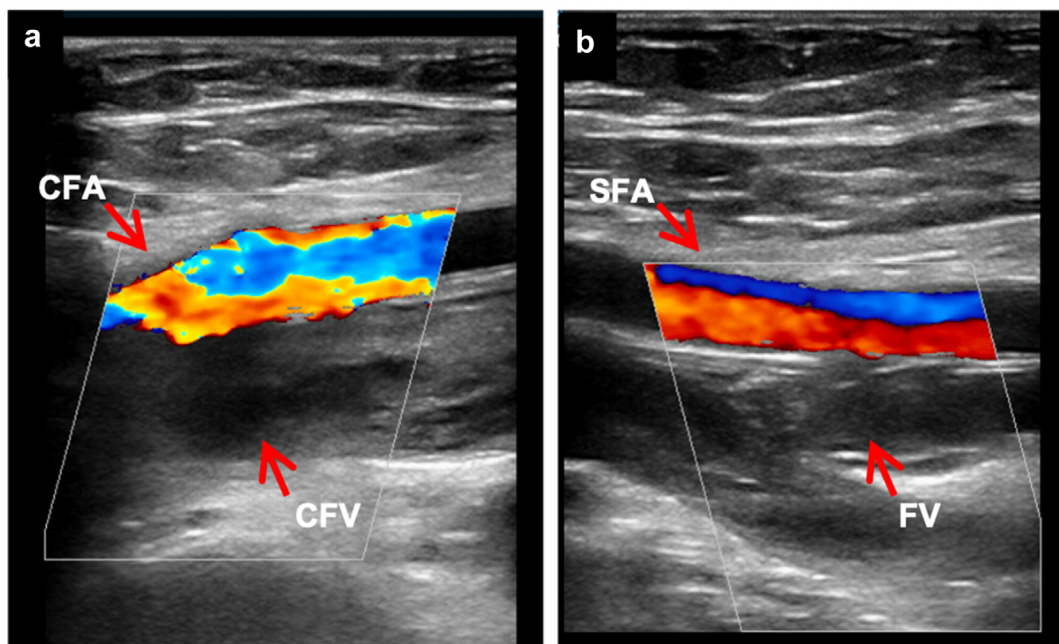
Alternatively, early thrombus removal provides the benefit of rapid symptom resolution and decreasing the risk of post-thrombotic syndrome (PTS),<sup>12-14</sup> a long-term complication of DVT characterized by chronic pain, edema, and irreversible skin changes associated with poor disease-specific quality of life.<sup>15</sup> Our patient presented with discomfort owing to the presence of ilio-femoral thrombus secondary to May-Thurner syndrome. As such, we pursued an interventional approach to relieve clot burden.

Thrombus removal using pharmacomechanical catheter-directed thrombolysis has been reported previously in pregnant patients as an effective strategy to decrease PTS.<sup>16</sup> However, to avoid the risk of hemorrhage from the use of thrombolytics during pregnancy,<sup>13,17,18</sup> we offered our patient mechanical thrombectomy using the ClotTriever system (Inari Medical). This system allows for thrombus removal with the collection bag as a gauge for residual thrombus, minimizing the need for continuous fluoroscopy and, thus, limiting radiation exposure. Compared with aspiration devices, the ClotTriever system may also minimize blood loss and remove a greater extent of the thrombus during each pass, further decreasing fluoroscopy time and radiation exposure.

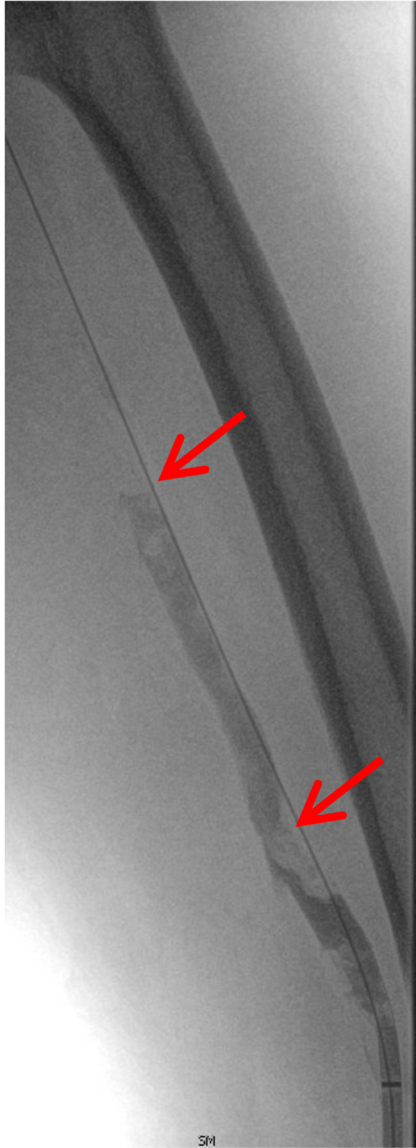
The ClotTriever system has been used safely for the treatment of DVT in two patients in the first trimester of pregnancy,<sup>19</sup> but to our knowledge has not been reported in the second trimester, during which the increased size of the uterus and proximity to the iliac veins may pose additional challenges and safety concerns. One of these concerns includes the hypothetical risk that the passage of the coring element of the ClotTriever system through the iliac vein may irritate the closely positioned uterus and potentially lead to the induction of labor. Additionally, although precautions were taken to minimize fluoroscopy time, radiation exposure in the prenatal period comes with the risks of teratogenicity and long-term malignancies.<sup>20</sup> Further minimization of radiation risk for this procedure may be accomplished through IVUS-guided mechanical thrombectomy with the ClotTriever device without fluoroscopy, which has been reported previously, albeit in first-trimester patients in whom visualization with IVUS is less challenging owing to a smaller uterine size.<sup>19</sup> Although future studies are needed to evaluate the safety and efficacy of the



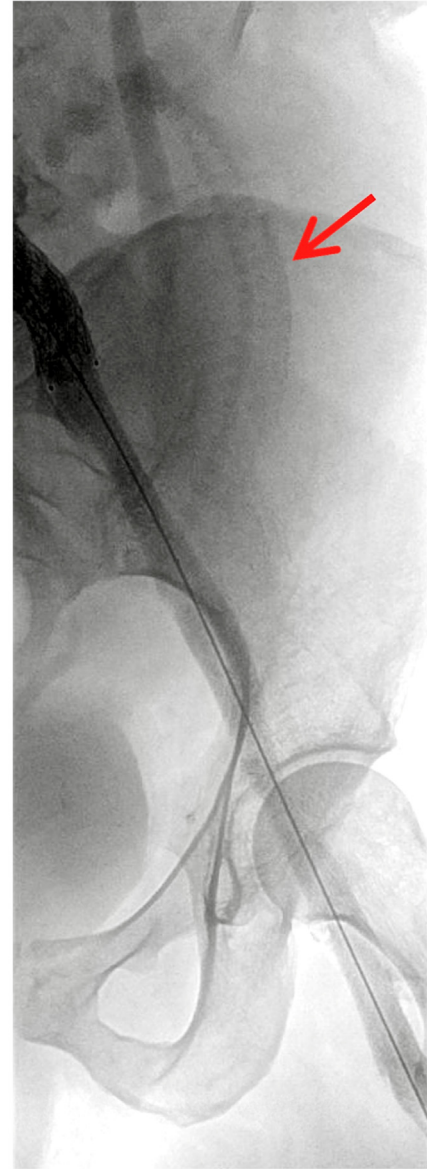
**Fig 2.** Venous duplex ultrasound finding demonstrating noncompressibility of the left femoral vein. **(Left)** Compression scan. **(Right)** Noncompression scan. *DFV*, deep femoral vein; *FV*, femoral vein.



**Fig 3.** Color flow imaging demonstrating complete occlusion of the left *FV*. **(A)** Complete occlusion of the *CFV* with good flow in the *CFA*. **(B)** Complete occlusion of the proximal femoral vein with good flow in the proximal femoral artery. *CFA*, common femoral artery; *CFV*, common femoral vein; *FV*, femoral vein; *SFA*, superficial femoral artery.



**Fig 4.** Pretreatment venogram demonstrating thrombus in the femoral vein.



**Fig 5.** Completion venogram demonstrating brisk flow through the common iliac vein stent. Arrow points to fetal spine.

device in pregnant patients, successful use of percutaneous mechanical thrombectomy using the ClotTriever system in this case suggests that it is a viable alternative to medical therapy alone.

## CONCLUSIONS

Percutaneous mechanical thrombectomy was a safe and effective treatment option for a second-trimester pregnant patient with iliofemoral DVT and May-Thurner syndrome. Although anticoagulation is the mainstay of pregnancy-related DVT treatment during pregnancy, early thrombus removal using mechanical thrombectomy may be an option for patients in whom rapid symptom resolution and reduction of PTS risk is prioritized.

## DISCLOSURES

None.

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