

CASE REPORT



A Rare Case of Simultaneous Acute Embolic Occlusions of the Right Upper and Lower Extremity, Recanalized With Endovascular Thrombectomy

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Abstract

When evaluating a patient with acute limb ischemia (ALI), it is essential to thoroughly assess the patient by taking a complete history and performing rapid diagnostic tests to preserve the patient's limb and life. In this case, we performed endovascular thrombectomy of acute simultaneous embolism of the right upper and lower extremity in the setting of atrial fibrillation and long-term oral anticoagulation with edoxaban. The main factor that can improve survival of patients with ALI is early aggressive treatment aimed at restoring the patency of occluded arteries.

Introduction

Acute peripheral arterial events can lead to a high fatality risk along with severe functional disability if emergency surgical or endovascular intervention is not performed. They are also more likely to cause upper extremity ischemia that results from the formation of mural thrombi.¹

Endovascular revascularization for acute simultaneous embolic occlusive lesions of the right brachial, femoral, and popliteal arteries has not been established, and reports of concomitant endovascular thrombectomy (EVT) have not been published.

Priority should increasingly be given to endovascular treatment over direct surgery due to its milder invasiveness and shortened hospital stay. In this case, we performed simultaneous EVT with the AngioJet thrombectomy system (Boston Scientific) and removed the clots, despite the occurrence of distal embolization. The AngioJet system creates a local low-pressure zone to entrain, fragment, and aspirate thrombi with the Bernoulli/Venturi principle of fluid dynamics. Multiple high-velocity, high-pressure saline jets are introduced through orifices in the distal catheter tip to create a localized low-pressure zone. This results in a powerful vacuum effect (~600 mm Hg) with the entrainment and dissociation of bulky thrombus.² The minimum vessel diameter in which the AngioJet can be used is 2 mm (maximum 20 mm); catheters with up to 140 cm length are also available.



Figure 1. (Top) Thrombosis at two levels of the right brachial artery. **(Bottom)** Thrombosis of the right radial artery.

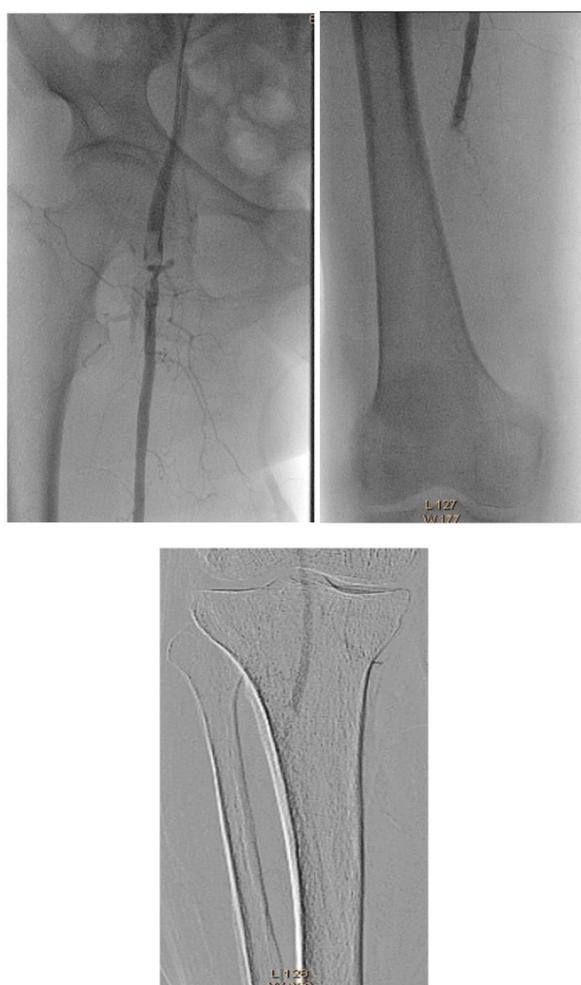


Figure 2. (Top) "Riding" thrombus at the bifurcation of the superficial femoral artery (SFA)/profunda femoris artery and thrombosis of the right distal SFA. **(Bottom)** Thrombosis of the right tibiofibular trunk.

second level of thrombosis in the brachial bifurcation into its ulnar and radial branches, and poor distal filling of the radial artery (**Figure 1**).

The diagnostic catheterization of the right lower extremity showed a "riding" thrombus at the bifurcation of the superficial femoral artery (SFA)/profunda femoris artery (PFA) and a long thrombotic occlusion starting from the middle segment of the SFA involving the popliteal artery and tibiofibular trunk (**Figure 2**). In the setting of simultaneous acute limb ischemia (ALI) of the right upper and lower limbs, we performed ad hoc concomitant percutaneous transluminal thrombectomy (PTA).

PTA of the Right Upper Extremity

A 6 Fr/90 cm Fortress introducer sheath (Biotronik) was placed at the right subclavian artery (**Figure 3**). Recanalization was done with a 0.018" Glidewire Advantage (Terumo) and a Trail Blazer Angled Support Catheter (Medtronic) (**Figure 4**). Balloon dilatations were done with a 2/120 mm Passeo-18

Case Presentation

A 74-year-old woman (height, 156 cm; weight, 52 kg; body mass index, 21.4 kg/m²) was admitted to our department because of numbness, coldness, and weakness of the right upper and lower extremities.

At 9:30 p.m. on March 10, 2023, she suddenly noted numbness, coldness, and weakness of the right upper extremity. At 6:30 a.m. on March 11, the day of admission, she felt the same signs in the right lower extremity.

The patient had a medical history of paroxysmal nonvalvular atrial fibrillation and was on therapy with the oral anticoagulant edoxaban (30 mg daily) due to her low body weight (52 kg). Other concomitant diseases were arterial hypertension and dyslipidemia. She had no history of smoking. Her familial history included stroke in her maternal grandmother.

Findings on Admission

The patient's blood pressure was 131/77 mm Hg (measured in the left upper extremity; it was unmeasurable in the right upper extremity), and she had an irregular heart rate of 87 bpm. Body temperature was 36.6°C. Consciousness was clear, and no impairment was noted in higher brain functions or the nervous system. There was mild paralysis in the right upper extremity, but no laterality was noted in superficial sensation. The pulses of the right brachial, radial, ulnar, popliteal, and tibial arteries were markedly attenuated, and the right extremities felt cold and numb. Ankle-brachial index (ABI) was right 0 and left 1.1.

Diagnostic Angiography

The patient received loading doses of dual antiplatelet therapy of clopidogrel 600 mg and acetylsalicylic acid 300 mg before the procedure. An intra-arterial bolus dose of heparin (5000 IU) was administered after sheath insertion and continued at 1000 U/h during the procedure.

The angiography was performed via the left common femoral artery. The diagnostic catheterization of the right upper limb showed a thrombus in the origin of the right brachial artery,

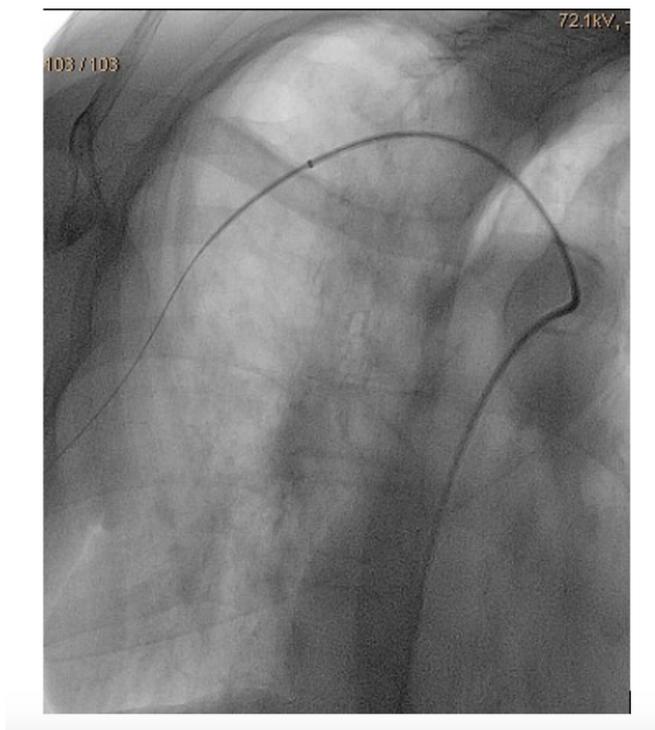


Figure 3. A 6 Fr/90 cm introducer sheath in the right subclavian artery.

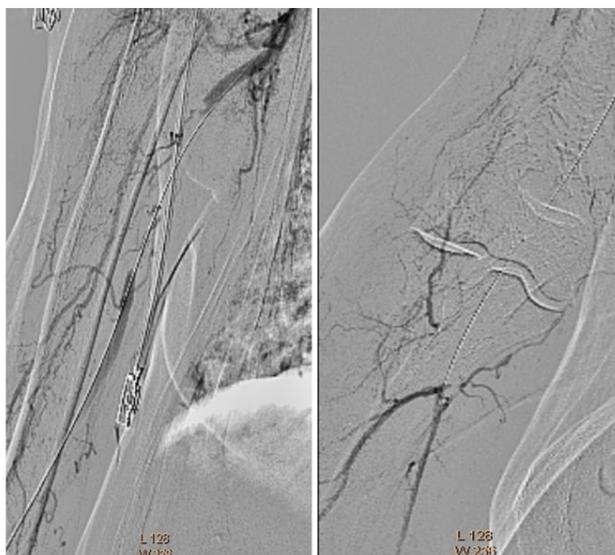


Figure 4. Recanalization of the right brachial and radial artery with a 0.018" Glidewire Advantage (Terumo) and a Trail Blazer Angled Support Catheter (Medtronic). **(Left)** Right brachial artery. **(Right)** Right brachial artery bifurcation.



Figure 5. (Top) Percutaneous transluminal thrombectomy: balloon dilatations of the right radial and brachial artery. **(Bottom)** NaviCross in the right radial artery.

Medical therapy after discharge included daily doses of acetylsalicylic acid 100 mg, clopidogrel 75 mg, acenocoumarol 4 mg (INR target range 2.0-2.5), bisoprolol 5 mg, rosuvastatin 20 mg, and pantoprazole 40 mg.

(Biotronik) and a 3/120 mm Paseo-18, without effect (**Figure 5**). Then, a 0.014" Fielder wire (Asahi) was placed to the palmar arch. Thromboaspiration of red thrombotic masses was done with a 6 Fr Eliminate aspiration catheter (Terumo). Again, there was no distal flow.

A 0.035" Storq wire (Cordis) was then placed in the right radial artery. Effective EVT with a 2.06 mm AngioJet Solent Omni was performed, first in the right brachial artery, then in the axillary artery (**Figure 6**). The brachial artery was successfully recanalized, but distal embolization in the brachial artery bifurcation occurred again. We repeated EVT with the same 2.06 mm AngioJet Solent Omni in the brachial and radial arteries. Blood flow was restored in the right brachial and radial arteries (**Figure 7**).

PTA of the Right Lower Extremity

The same introducer was redirected with the tip in the right common femoral artery. PTA of the right SFA, PFA, and popliteal and posterior tibial arteries was performed. Recanalization with a 0.035" Stiff Glidewire (Terumo) and a NaviCross Support Catheter (Terumo). The "riding" thrombus at the SFA/PFA bifurcation then migrated distally and occluded the SFA and PFA (**Figure 8**). We began EVT from the proximal segment of the SFA, with the same 2.06 mm AngioJet Solent Omni catheter. EVT was performed in the middle segment of the SFA and the popliteal artery (**Figure 9**). Due to residual thrombosis in the distal segment of the SFA, a balloon dilatation with a 5/120 mm Armada catheter (Abbott) was done (**Figure 10**).

Thereafter, the right PFA was recanalized with a 0.035" Angulated Glidewire (Terumo) and again EVT was performed with the 2.06 mm AngioJet Solent Omni (**Figure 11**).

Balloon dilatations in the posterior tibial and tibiofibular trunk were done with 2/120 mm and 3/120 mm Pacific Plus balloons (Medtronic). Because of persistent thrombosis in the proximal segment of the posterior tibial artery, EVT was again performed with the 2.06 mm AngioJet Solent Omni. Finally, distal blood flow was restored in the right SFA, PFA, and popliteal and posterior tibial arteries (**Figure 12**).

Post procedure, the patient received an intra-arterial infusion with unfractionated heparin (1000 IU/h) via the introducer with its tip in the right common femoral artery for 48 hours until therapeutic international normalized ratio (INR; 2.0-2.5) was reached.

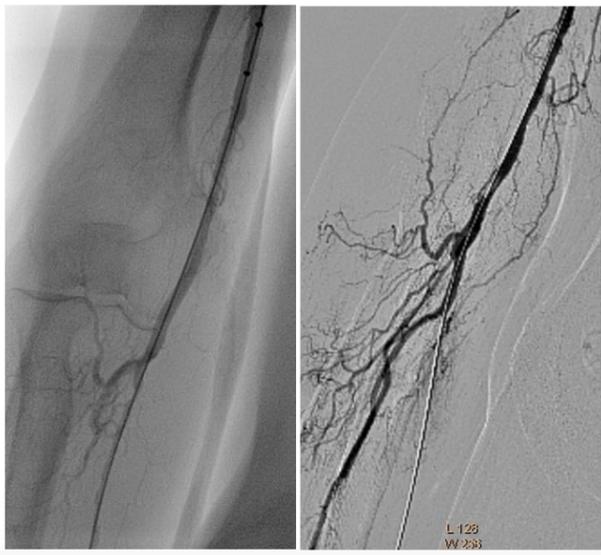


Figure 6. Endovascular thrombectomy with AngioJet Solent Omni (Boston Scientific) in the right radial and brachial artery.

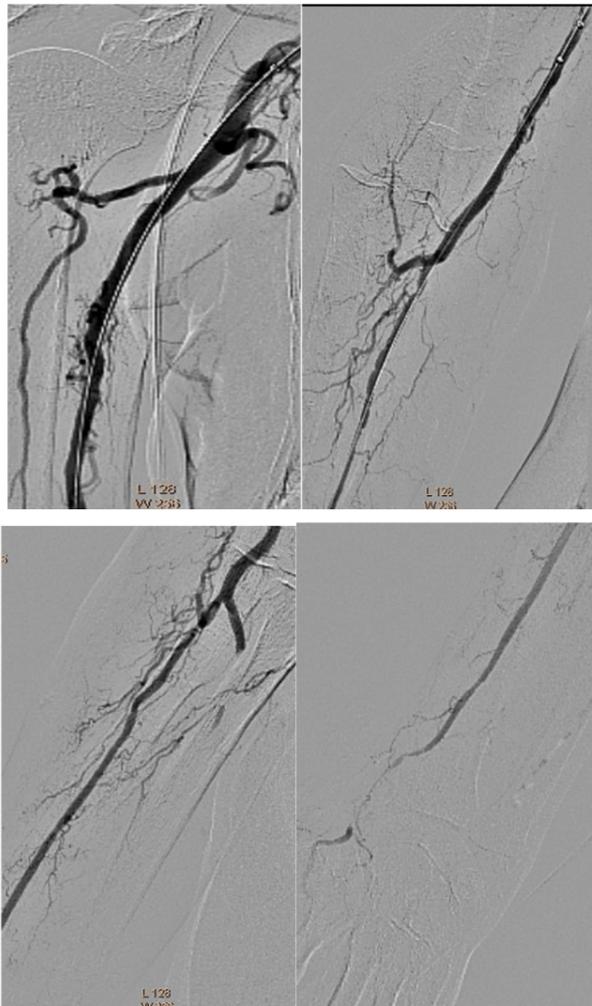


Figure 7. (Top) Right brachial artery after endovascular thrombectomy (EVT) with the AngioJet Solent Omni (Boston Scientific). **(Bottom)** Right radial artery after EVT with the AngioJet Solent Omni.

Conclusions

When evaluating a patient with ALI, it is essential to thoroughly assess the patient by taking a complete history and performing rapid diagnostic tests to preserve the patient's limb and life. This case also emphasizes the importance of endovascular recanalization using the AngioJet thrombectomy system. Early aggressive treatment with a goal of restoring the patency of occluded arteries can improve the survival of patients with ALI.

EVT can be a simple, safe, and well-tolerated treatment modality for patients with ALI. However, such treatment should be performed in centers with extensive experience with EVT in different vascular areas and with full access to vascular surgical intervention in case of a failed endovascular approach. ■

The authors have completed and returned the ICMJE Form for Disclosure of Potential Conflicts of Interest. The authors report no financial relationships or conflicts of interest regarding the content herein.

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The patient was discharged after 3 days. She returned 15 and 30 days later for a planned Doppler sonography, which objectified the preserved result of the EVT of the right axillary, brachial, radial, femoral, popliteal, and posterior tibial arteries (**Figures 13A-C**).

Discussion

Embolism is defined as debris in the vascular system that obstructs a distal artery. Acute thromboembolic events are limb-threatening and require immediate treatment.

Lower extremity ischemia accounts for most limb ischemia cases. Only 2% to 18% of limb ischemia episodes occur in the upper extremity.³ The most common cause of acute upper extremity ischemia is emboli from a cardiac source. A mural thrombus obstructs peripheral distal arteries, resulting in an acute disruption of blood flow.⁴ The most common site of obstruction is at the origin of the profunda brachial artery or the bifurcation of the brachial artery.

Thrombosis, atherosclerotic stenosis, arterial trauma, arterial dissection, and acute thrombosis of a stent or graft can also cause embolism. Proximal atherosclerotic debris is a source of embolus debris from the proximal aorta that breaks and lodges in the peripheral vessels.⁵

Acute embolism first manifests as a sensory deficit and is followed by motor deficits and muscle weakness. The limb also becomes pale and a neurosensory deficiency occurs due to a lack of established collaterals in a healthy artery.

Rutherford classifies ALI into 3 types based on clinical findings and Doppler measurements: viable extremities, threatened extremities, and irreversible defects.

Amputation is considered instead of revascularization when irreversible defects occur.⁶

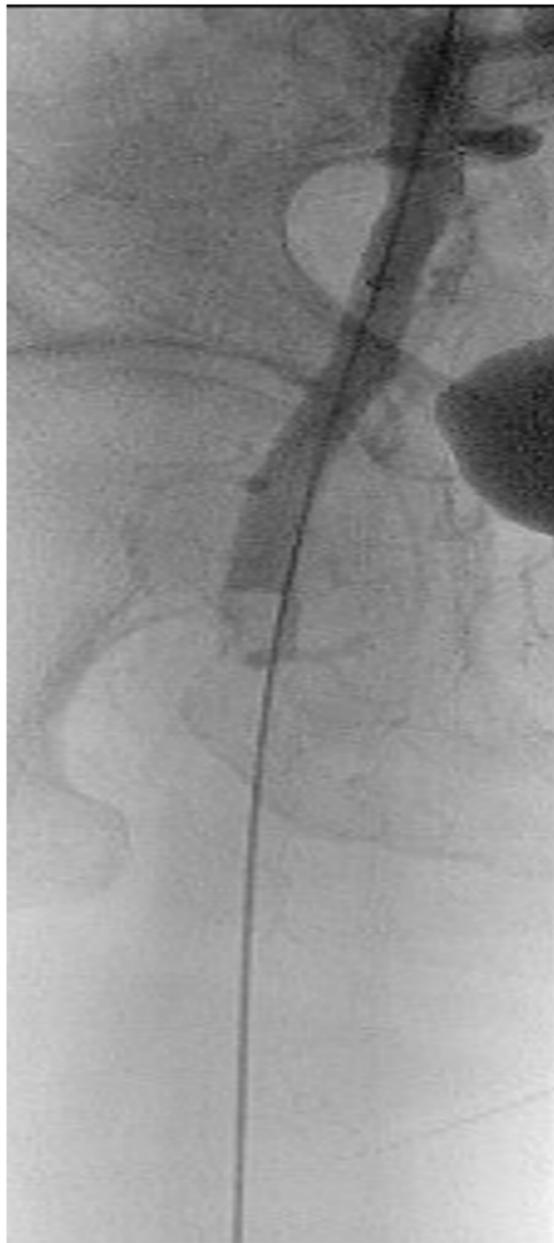


Figure 8. Occlusion of the superficial femoral artery/ profunda femoris artery after passing with a 0.035" wire.

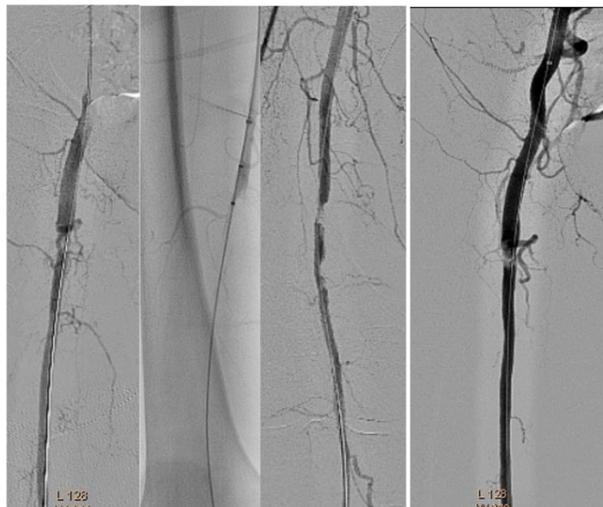


Figure 9. Endovascular thrombectomy of the superficial femoral artery with the AngioJet Solent Omni (Boston Scientific).

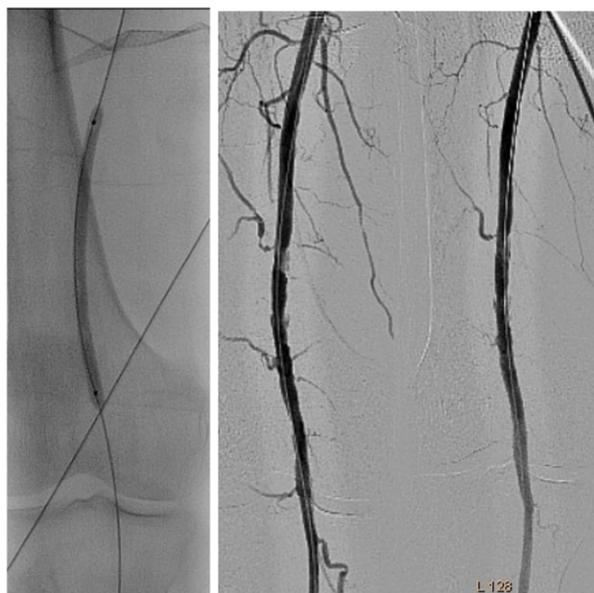


Figure 10. Endovascular thrombectomy of the superficial femoral artery with the AngioJet Solent Omni (Boston Scientific).

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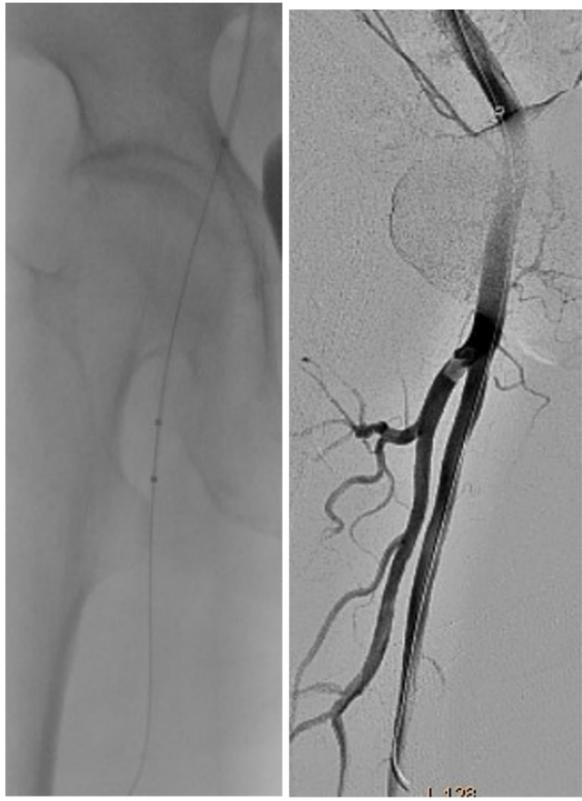


Figure 11. Endovascular thrombectomy of the right profunda femoris artery.

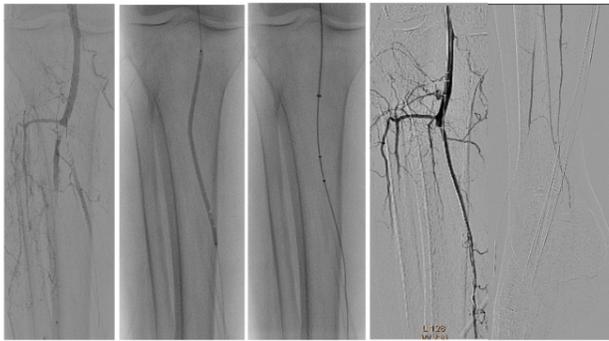


Figure 12. Balloon dilatation and endovascular thrombectomy of the right posterior tibial artery.



Figure 13A. Doppler sonography 15 days after discharge. Right Brachial artery.

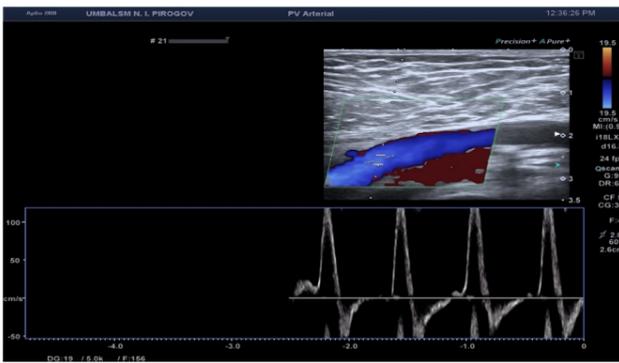


Figure 13B. Doppler sonography 15 days after discharge. (Top) Right radial artery. (Bottom) Right femoral artery.

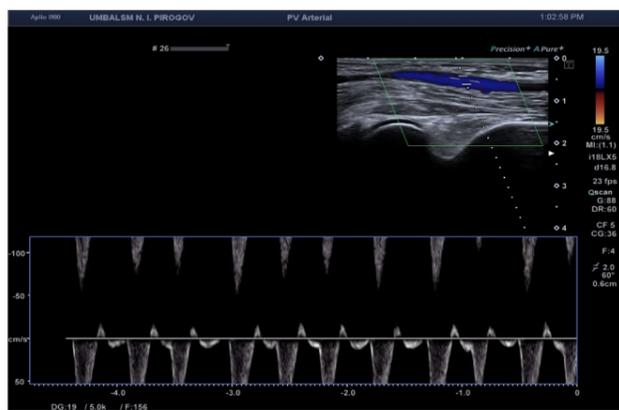


Figure 13C. Doppler sonography 15 days after discharge. Right posterior tibial artery.