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CASE REPORT

# Rheolytic thrombectomy of subacute subclavian artery thromboembolism with double antiembolic filter protection

## Subakut subklavyen arter tromboembolisinin ikili antiembolik filtre koruması altında reolitik trombektomi ile başarılı tedavisi

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***Summary–*** Presently described is a case of subacute subclavian artery thrombosis treated with rheolytic thrombectomy, using the AngioJet system and direct stenting, in addition to double antiembolic filter protection of both the vertebral and brachial arteries.

***Özet–*** Bu yazıda, vertebral arter ve brakiyal arterin ikili antiembolik filtre ile koruma altına alınması suretiyle yapılan reolitik trombektomi (AngioJet sistemi) yanında doğrudan stent yerleştirilen bir subklavyen arteri tromboembolizm olgusu sunuldu.

Vertebrobasilar insufficiency and upper-extremity ischemic symptoms indicate subclavian artery thrombosis or stenosis. Catastrophic events, including cerebellar and distal ischemic symptoms can be prevented by early diagnosis and treatment of these lesions. Rheolytic thrombectomy catheters are capable of clearing the large thrombus burden in cases of this kind, though thrombolytic therapy and surgical treatment modalities have been the best-known therapies for subclavian thrombosis. These thrombectomy catheters also have intrinsic embolic properties, of use during the procedure.

Described in the present report is a case of subacute subclavian artery thrombosis treated with rheolytic thrombectomy using the AngioJet system (Boston Scientific, Inc., Natick, MA, USA) and direct stenting, as well as double antiembolic filter protection of both the vertebral and brachial arteries.

## CASE REPORT

A 58-year-old male patient who had undergone coronary artery bypass graft (left internal mammary artery graft to the left anterior descending [LAD] artery and saphenous venous graft to the right coronary artery) 6 years prior, presented to our emergency department with symptoms of dizziness, vertigo, left-hand pain and color changes of the 1st and 2nd fingers. Electrocardiography showed normal sinus rhythm, and echocardiography showed nonspecific findings. Physical examination revealed ischemic lesions in the 1st and 2nd fingers of the left hand. Neurologic examination showed cerebellar ataxia. Magnetic resonance imaging showed ischemic gliotic lesions in the left cerebellum. The patient was referred to the catheter lab for digital subtraction angiography of the carotid, vertebral, and upper-extremity arteries. There was a huge thrombus, extended from the left subclavian artery ostium to the vertebral artery ostium on angiography (Figure 1a, Video 1*). During right selective angiography of the vertebral artery, contrast media traversed from the right vertebral artery to the left vertebral artery, and the left distal subclavian artery was filled, in the craniocaudal direction (Figure 1b). In the same session, coronary angiogram showed intermediate lesions in the left main coronary and LAD arteries, with the internal mammary artery bypass graft occluded.

**Abbreviation:**

*LAD* *Left anterior descending*

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After consultation with cardiovascular surgeons and neurologists, endovascular treatment was selected. After informed consent was obtained from the patient and his family, a 7-F introducer sheath was placed in the right common femoral artery, and 7500 units of unfractionated heparin was intra-arterially administered. A 5-F Judkins right 4.0 catheter was engaged in the left subclavian artery ostium, and the thrombotic lesion was gently crossed with 0.035-in, 260-cm ZIPwire Hydrophilic Guidewire (Boston Scientific, Inc., Natick, MA, USA). A Judkins right 4.0 catheter was distally advanced to the axillary artery, and Supra Core 260-cm extra-stiff guidewire (Abbott Vascular, Inc., Abbott Park, IL, USA) was placed, to increase backup support. After placement of a 7-F 90-cm Flexor Shuttle Select Guiding Sheath (Cook Medical, Inc., Bloomington, IN, USA) in the left subclavian artery ostium, 2 Emboshield Nav6 antiembolic filters (Abbott Vascular, Inc., Abbott Park, IL, USA) were advanced through the shuttle sheath, and placed in the V2 segment of the left vertebral artery and left brachial artery, respectively (Figures 1c, d). An AngioJet Omni catheter (Boston Scientific, Inc., Natick, MA, USA) was passed through the thrombosed subclavian segment 3 times (Figure 2c). A prominent decrease of the thrombus load was observed after rheolytic thrombectomy.

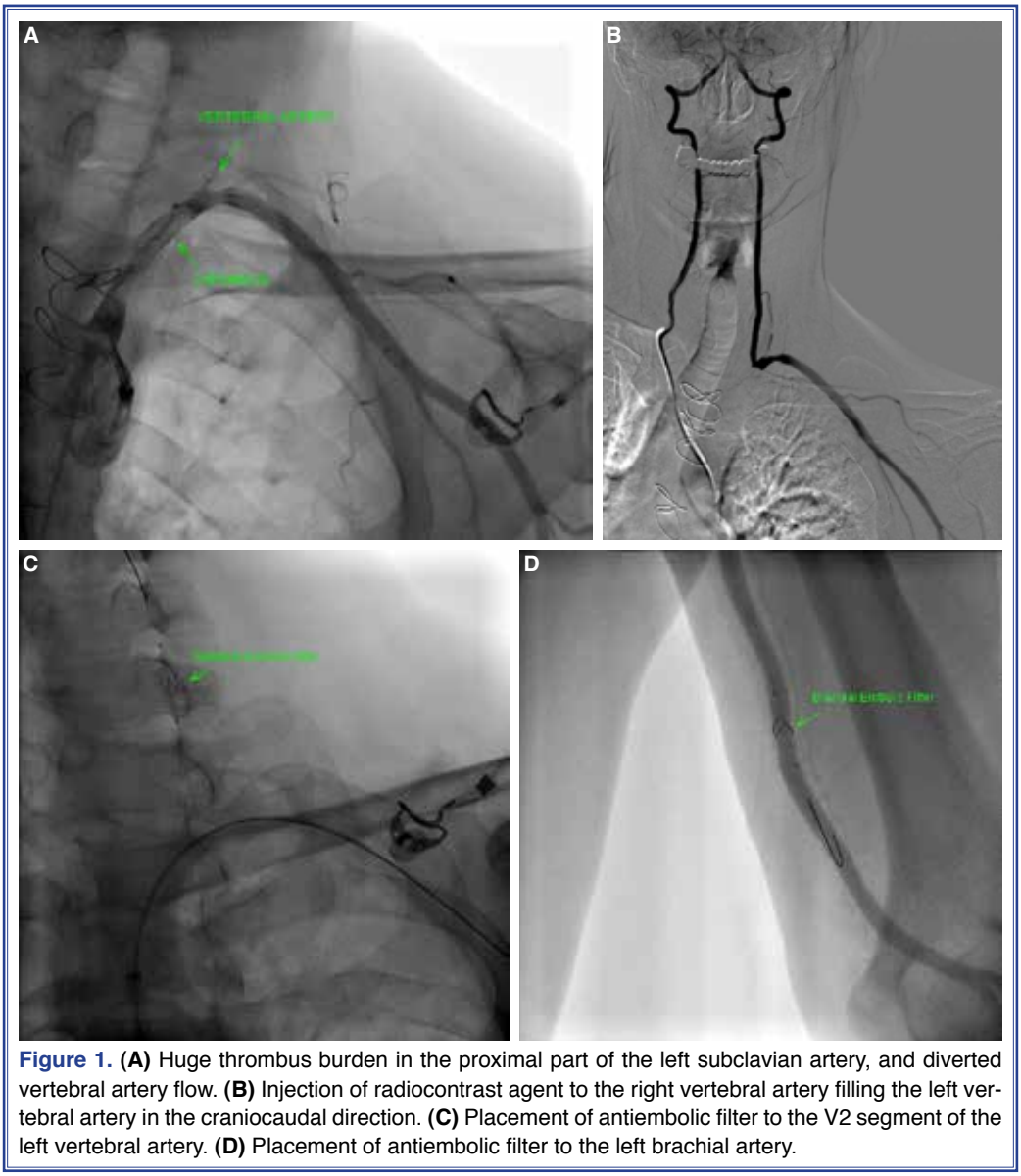


**Figure 1.** **(A)** Huge thrombus burden in the proximal part of the left subclavian artery, and diverted vertebral artery flow. **(B)** Injection of radiocontrast agent to the right vertebral artery filling the left vertebral artery in the craniocaudal direction. **(C)** Placement of antiembolic filter to the V2 segment of the left vertebral artery. **(D)** Placement of antiembolic filter to the left brachial artery.

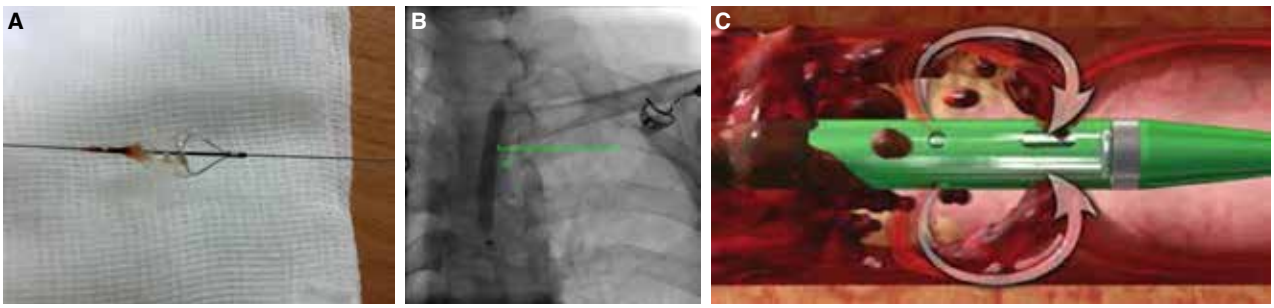


**Figure 2.** **(A)** Small pieces of thrombus captured in the vertebral artery filter. **(B)** Direct stenting of the proximal part of the subclavian artery, with 7.0x30-mm balloon expandable stent. **(C)** Anjiojet Omni catheter showing thrombus retrieval mechanism.

Vertebral artery flow was directed in the caudocranial direction immediately after the catheter passages. Prior to direct implantation of the 7x30-mm Omnilink balloon expandable peripheral stent (Abbott Vascular, Inc., Abbott Park, IL, USA), the antiembolic filters were removed. That the vertebral artery antiembolic filter had captured small thrombotic debris could be clearly observed (Figure 2b). After direct stenting, the lesion was fully covered (Figure 2a, Video 2*). Local intravenous tirofiban bolus was applied, and 24-hour intravenous tirofiban infusion was continued, as a usual dosage for coronary procedures. Dual antiplatelet therapy (acetylsalicylic acid 100 mg/day and clopidogrel 75 mg/day) had been administered, 1 month, and only acetylsalicylic acid was continued after first month. On the second postprocedural day, the patient was discharged. First-month clinical, duplex, and magnetic resonance imaging controls showed normal findings.

## DISCUSSION

While atherosclerotic lesions primarily comprise the etiology of subclavian artery thrombosis, embolism and trauma should also be considered. Iatrogenic trauma during endovascular intervention has been frequently encountered during the past decade.[1] Neither prothrombotic etiology nor vasculitides were found in the present patient. As the patient had coronary heart disease, the highly probable etiology was atherosclerotic plaque rupture.

Clinical symptoms of subclavian artery stenosis or thrombosis could be subclavian steal syndrome (vertigo, dizziness during left arm exercise, vision abnormalities, ataxia, dysphasia, or confusion), coronary steal phenomenon (myocardial ischemia), or distal embolism. Cerebellar infarcts and typical subclavian steal syndrome were observed in the symptomatology of the present patient. Internal mammary artery bypass graft was occluded, likely due to the noncritical lesions of the left main coronary and LAD arteries prior to the thrombotic event.

A "watch and see" approach, using antiplatelet drugs, heparin, and follow-up angiographic evaluation, could have been utilized in the present case, as has been recommended.[2,3] However, rheolytic thrombectomy to aspirate the large thrombus burden seemed the safer choice. The option of surgically transpositioning the prevertebral subclavian artery to the carotid artery was not considered, due to the recent occurrence of cerebellar stroke, and in order to avoid surgical trauma. The efficacy of endovascular treatment was also supported by the findings of a recent case series.[4,5] Thus, endovascular therapy was selected, and thrombectomy plus direct stenting by double protection was performed. Advised is thrombus entrapment with direct balloon expandable stenting, and occasionally even covered stenting.[6–8] Fortunately, the considerable thrombus burden was addressed by thrombectomy catheter, and a covered stent was not necessary.

### Conclusion

It was presently decided to emphasize that appropriately sized rheolytic thrombectomy catheters and direct stenting with antiembolic filter protection can be safely used to address thrombotic lesions of the subclavian arteries.

***Conflict-of-interest issues regarding the authorship or article: None declared.***

****Supplementary video files associated with this article can be found in the online version of the journal.***

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*Keywords:* Rheolytic thrombectomy; thrombosis; upper limb ischemia.

*Anahtar sözcükler:* Reolitik trombektomi; tromboz; üst ekstremite iskemisi.