Turkish Journal of Neurology

Turk J Neurol 2025;31(3):383-385
Doi: 10.55697/tnd.2025.313

LETTER TO THE EDITOR

A rare case of subclavian steal phenomenon with anterograde vertebral artery flow

Ahmet Yabalak[1], **Osman Kayapınar**[2]

[1]Department of Neurology, Düzce University Faculty of Medicine, Düzce, Türkiye
[2]Department of Cardiology, Düzce University Faculty of Medicine, Düzce, Türkiye

In the upper extremities, atherosclerosis most commonly affects the subclavian artery and the brachiocephalic trunk. Disease of the subclavian artery can lead to ischemia of the upper limbs, the vertebrobasilar system, and the coronary arteries. The incidence in the community was reported to be between 3% and 18%.[1,2] Although atherosclerosis is the most common etiology, it can also be caused by radiation exposure, connective tissue disease, and external compression.[1,2]

Vascular steal phenomenon is the filling of the distal part of an occluded or severely stenosed segment of an artery by flow from another artery. It is most commonly observed in the subclavian arteries.[2] As in the case reported by Yürekli et al.,[3] retrograde flow in the vertebral artery is expected on the side of subclavian artery occlusion or stenosis. Herein, we presented a case in which, contrary to expectations, anterograde flow was observed in the vertebral artery; however, there was stealing through collaterals.

A 78-year-old female patient was admitted to the emergency department with 4 h of transient diplopia. When the patient awakened in the morning, she complained of diplopia on downward gaze. There was no accompanying dizziness or other symptoms and no previous similar episode. The patient had no known medical conditions other than rheumatoid arthritis and was receiving treatment with golimumab. The neurological examination was normal, diffusion-weighted magnetic resonance imaging showed no acute pathology. The patient was admitted to the neurology clinic with a diagnosis of transient ischemic attack and acetyl salicylic acid and clopidogrel treatment was started. Computed tomography angiography showed approximately 70% atherosclerotic stenosis in both proximal internal carotid arteries (ICAs). Bilateral vertebral and basilar arteries were patent. Doppler ultrasonography showed a peak systolic flow velocity of 141.7 cm/sec in the right ICA and 187.2 cm/sec in the left ICA. Catheter angiography was performed, as the patient had asymptomatic ICA stenosis and a posterior circulation transient ischemic attack clinic. Stenosis was found to be 60% in the left ICA and 25% in the right ICA. The right subclavian artery was occluded in the middle segment after the vertebral artery origin. On left subclavian injection, it was observed that the subclavian artery was occluded just distal to the vertebral artery origin, and there was anterograde flow in the vertebral artery. The ascending cervical artery filled retrogradely through the collaterals arising from the V2 and V3 segments of the vertebral artery and filled the subclavian artery just distal to the occluded segment (Figure 1). Balloon angioplasty was performed on both subclavian arteries, and the procedure was terminated when adequate patency was achieved. Written informed consent was obtained from the patient.

Subclavian artery disease can cause upper limb claudication, distal embolism, weakness,

Correspondence: Ahmet Yabalak, MD. Düzce Üniversitesi Tıp Fakültesi, Nöroloji Anabilim Dalı, 81620 Düzce, Türkiye
E-mail: ahmetyabalak@windowslive.com
Received: October 25, 2024 **Accepted:** June 16, 2025 **Published online:** September 15, 2025
Cite this article as: Yabalak A, Kayapınar O. A rare case of subclavian steal phenomenon with anterograde vertebral artery flow. Turk J Neurol 2025;31(3):383-385. doi: 10.55697/tnd.2025.313.

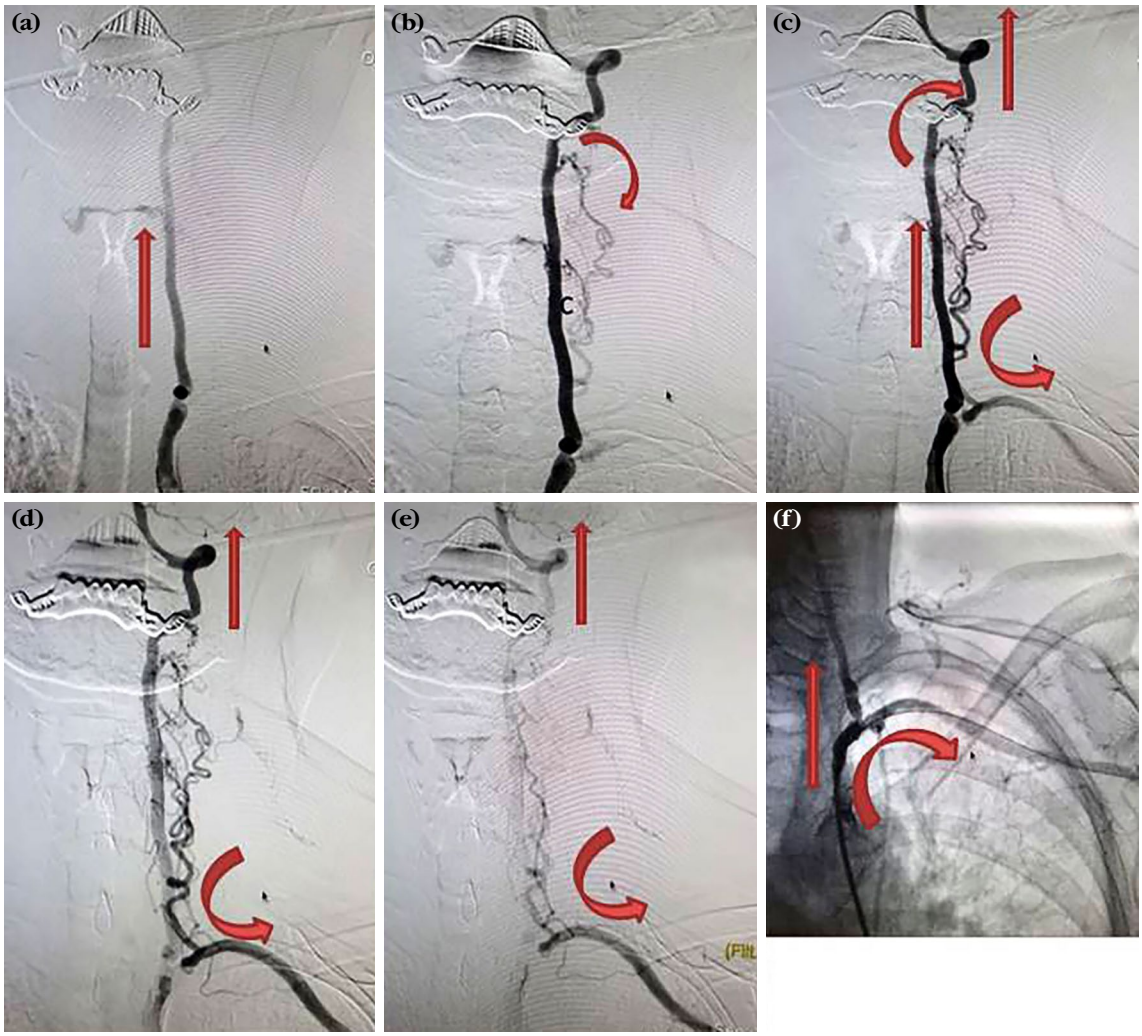

Figure 1. **(a-e)** Left subclavian injection: Subclavian artery occluded after the vertebral artery orifice. Retrograde filling of the ascending cervical artery and filling of the subclavian artery by the muscle collaterals arising from the V2 and V3 segments of the vertebral artery. **(f)** Subclavian artery filling was normal after balloon angioplasty.

and necrosis of the fingers. Neurologically, it can cause visual symptoms, syncope, ataxia, dizziness, dysarthria, and diplopia. Patients who undergone coronary artery bypass grafting with the internal mammillary artery may develop ischemic heart disease and angina pectoris. The main risk factors are hypertension, smoking, and peripheral arterial disease. Patients with subclavian steal syndrome have been reported to have a 26% risk of stroke at two years of follow-up, but most of these strokes were in the anterior circulation.[2]

The difference in blood pressure between the two arms, ultrasonography, magnetic resonance imaging, and computed tomography can be used in the diagnosis, but the gold standard is catheter angiography. A difference of more than 15 mmHg in systolic blood pressure between the arms is diagnostic of subclavian artery stenosis with 50% sensitivity and 90% specificity.[1] In our case, no blood pressure difference was detected between the two upper extremities, and this was attributed to occlusion in both subclavian arteries.

There are endovascular and surgical treatment options; however, there are no randomized controlled trials comparing the two treatments. The 2017 European Society of Cardiology guidelines recommend revascularization in patients with symptomatic occlusion or stenosis or in asymptomatic patients with subclavian steal phenomenon.[4]

Subclavian artery disease is most common on the left side and in the proximal segment of the subclavian artery. A study by Jahic et al.[5] evaluating patients undergoing endovascular recanalization for subclavian artery occlusion reported that 88.4% of patients had an occlusion or stenosis in the left subclavian artery and 92.3% had the lesion in the proximal segment of the artery. In our case, although the occlusion of the right subclavian artery was distal to the vertebral artery origin, as is often expected, the occlusion of the left subclavian artery distal to the vertebral artery origin caused these rare hemodynamic results.

In conclusion, it is important to consider that although retrograde flow in the vertebral artery on the side of the occluded artery is expected in subclavian steal phenomenon, steal may rarely develop via collaterals from the vertebral artery. Catheter angiography should be performed in patients with atherosclerotic disease when the cause of a posterior circulation transient ischemic attack or stroke cannot be explained by noninvasive imaging.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: Idea, concept, data collection and or processing, writing & review: A.Y., O.K.; Design, literature review, references: A.Y.

Conflict of Interest: The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding: The authors received no financial support for the research and/or authorship of this article.

REFERENCES

1. English JA, Carell ES, Guidera SA, Tripp HF. Angiographic prevalence and clinical predictors of left subclavian stenosis in patients undergoing diagnostic cardiac catheterization. Catheter Cardiovasc Interv 2001;54:8-11. doi: 10.1002/ccd.1230.
2. Bajko Z, Motataianu A, Stoian A, Barcutean L, Andone S, Maier S, et al. Prevalence and clinical characteristics of subclavian steal phenomenon/syndrome in patients with acute ischemic stroke. J Clin Med 2021;10:5237. doi: 10.3390/jcm10225237.
3. Yürekli VA, Kutluhan S, Gürkaş E, Orhan G. Subclavian steal syndrome treated by endovascular approach in the interventional Neurology clinic. Turk J Neurol 2013;19:66-68.
4. Aboyans V, Ricco JB, Bartelink ML, Björck M, Brodmann M, Cohner T, et al. 2017 ESC Guidelines on the Diagnosis and Treatment of Peripheral Arterial Diseases, in collaboration with the European Society for Vascular Surgery (ESVS). Kardiol Pol 2017;75:1065-160. doi: 10.5603/KP.2017.0216.
5. Jahic E, Avdagic H, Iveljic I, Krdzalic A. Percutaneous transluminal angioplasty of subclavian artery lesions. Med Arch 2019;73:28-31. doi: 10.5455/medarh.2019.73.28-31.