

CASE REPORT

Endovascular Correction of Ostial Stenosis of a Tortuous Right Subclavian Artery in a Patient with Crisis Course of Arterial Hypertension: A Clinical Case

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Abstract

Background: Subclavian artery stenosis is a rare but clinically significant cause of vertebrobasilar insufficiency and upper extremity ischaemia. The presence of marked vessel tortuosity poses substantial technical challenges for endovascular revascularisation.

Case summary: A 62-year-old male presented with progressive numbness and paraesthesia of the right upper extremity, right-sided cephalic bruit, and labile arterial hypertension persisting despite optimal medical therapy. Instrumental examination revealed 95% ostial stenosis of the right subclavian artery with severe tortuosity and subclavian-vertebral steal syndrome. Coronary angiography demonstrated haemodynamically insignificant coronary artery disease. Successful endovascular treatment was performed. After predilatation, a balloon-expandable Express LD Vascular stent (9 × 25 mm) was implanted. Control angiography showed good stent apposition, residual stenosis <10%, and restoration of antegrade flow in the right vertebral artery. Immediate symptom relief was achieved. The patient was discharged on the third postoperative day on dual antiplatelet therapy. At 1-month follow-up, the patient remained asymptomatic with no recurrence of neurological symptoms.

Discussion: This case underscores the importance of access site selection in complex subclavian artery anatomy. Femoral access provided an optimal trajectory for device delivery despite severe vessel tortuosity. A balloon-expandable stent was chosen to ensure precise ostial implantation and high radial force. The chosen strategy is consistent with current ESC guidelines, which favour endovascular therapy in patients at high surgical risk.

Keywords: Subclavian artery, stenosis, subclavian-vertebral steal syndrome, stenting.

Introduction

Atherosclerotic occlusive-stenotic disease of the proximal subclavian artery is a rare but clinically significant pathology that can lead to upper extremity ischaemia and symptomatic vertebrobasilar insufficiency due to subclavian-vertebral steal syndrome [1, 2]. According to the 2024 European Society of Cardiology (ESC) guidelines on the management of patients with peripheral arterial and aortic diseases, revascularisation is indicated for symptomatic subclavian artery disease (Class IIa, Level B); however, no specific intervention method is preferred, leaving the choice to the operator based on anatomical features and patient risk

profile [3]. Endovascular correction has gained widespread acceptance due to its lower invasiveness, shorter procedure time and hospital stay, and favourable safety profile compared with open surgical interventions, particularly in patients at high surgical risk [4, 5]. Nevertheless, anatomical complexities such as vessel tortuosity, severe calcification, or anomalous origin may limit technical success. We present a clinical case of successful endovascular correction of critical stenosis of a tortuous right subclavian artery, with emphasis on access selection and stent type to overcome anatomical challenges.

Case Report

A 62-year-old male presented with a 2-year history of progressive numbness and paraesthesia in the right upper extremity, right-sided cephalic bruit, intermittent dizziness and gait instability, as well as labile arterial hypertension with blood pressure spikes up to 220/90 mmHg despite maximal antihypertensive therapy. On admission, blood pressure was 190/80 mmHg, heart rate 80 bpm, regular rhythm. Physical examination revealed no abnormalities except for diminished peripheral pulse in the right arm. No focal neurological deficits were noted. Medical history included stage III–IV hypertension, high cardiovascular risk, hyperlipidaemia, and chronic gastritis in remission. Diabetes mellitus, smoking, and prior strokes were denied. Family history was unremarkable. In 2026, comprehensive instrumental examination was performed. Duplex ultrasound and multislice computed tomography (MSCT) revealed 80–90% ostial stenosis of the right subclavian artery with marked proximal tortuosity and signs of subclavian-vertebral steal syndrome (Figure 1).

Coronary angiography demonstrated 50% stenosis of the mid-segment of the left anterior descending artery (Figure 2) and hypoplasia of the right coronary artery, with left-dominant coronary circulation.

Echocardiography revealed left ventricular ejection fraction 59%, concentric left ventricular hypertrophy, aortic valve calcification, and grade 1 diastolic dysfunction. Laboratory findings: elevated LDL cholesterol (5.5 mmol/L), mildly elevated ALT (169 U/L); renal function and glucose were within normal limits. Procedure description. Given the anatomical features, right femoral access was chosen to provide optimal coaxial approach to the ostium of the right subclavian artery, bypassing the marked tortuosity. Under local anaesthesia (15 ml of 0.5% novocaine solution), puncture of the right common femoral artery was performed. Angiography confirmed 90–95% ostial stenosis of the right subclavian artery (Figure 3).

Intravenous heparin 9000 IU was administered for systemic anticoagulation. A 0.035-inch guidewire was advanced across the stenotic zone. Predilatation was performed with a Mustang balloon catheter (7.0 × 20 mm). Then, under fluoroscopic guidance, a balloon-expandable Express LD Vascular stent (9 × 25 mm) was implanted at the stenosis site. Control angiography confirmed good stent apposition, residual stenosis <10%, and restoration of antegrade flow in the right vertebral artery (Figure 4).

No distal embolisation was observed. The introducer was removed, haemostasis achieved, and a compressive

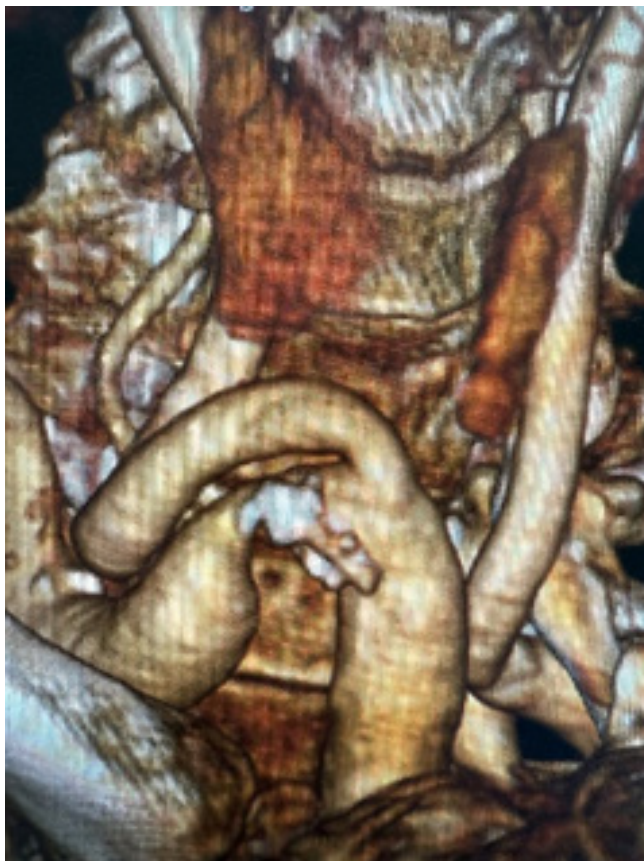


Figure 1: Preoperative digital subtraction angiography showing 90% ostial stenosis of the right subclavian artery.



Figure 2: 50% stenosis of the mid-segment of the left anterior descending artery.



Figure 3: Ostial stenosis of the right subclavian artery up to 90–95%.

aseptic dressing applied. The patient was transferred to the intensive care unit for 24-hour observation.

Clinical Chronological Period

Symptom onset (right arm numbness, dizziness, labile hypertension) was noted in 2023. In May 2026, the preoperative workup was completed, including duplex ultrasound, MSCT, and coronary angiography, confirming critical subclavian artery stenosis with steal syndrome. Endovascular stenting was performed in 2026. On the first postoperative day, complete symptom resolution was achieved, with no negative neurological dynamics. On the third day, the patient was discharged on dual antiplatelet therapy (aspirin and clopidogrel) with optimised lipid-lowering and antihypertensive therapy. At 1-month follow-up, the patient remained asymptomatic; no restenosis or recurrence of neurological symptoms was documented. Follow-up instrumental examination is scheduled at 6 and 12 months.

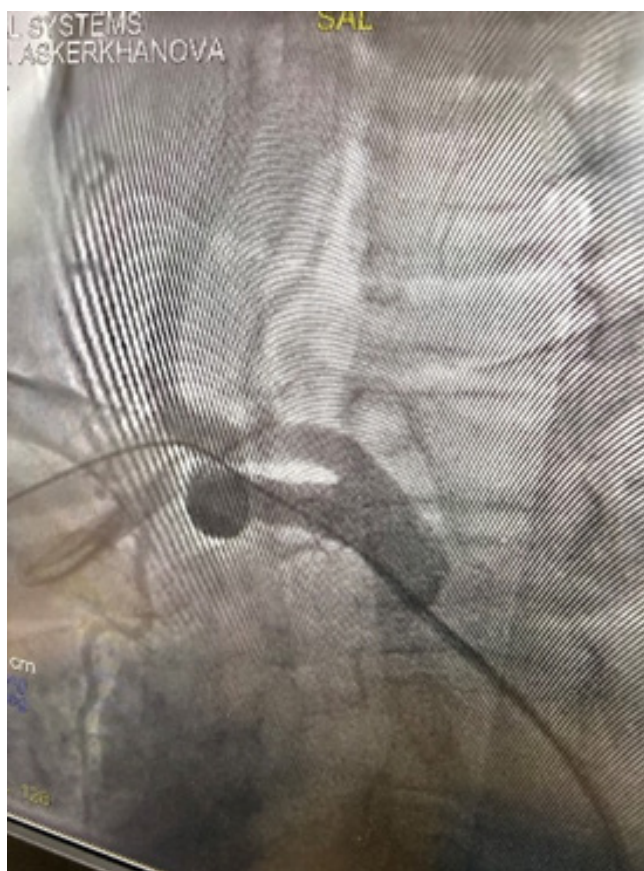


Figure 4: Stent at the ostium of the right subclavian artery.

Discussion

This case demonstrates successful treatment of critical subclavian artery stenosis with pronounced vessel tortuosity – a scenario that creates significant technical challenges for endovascular therapy. Several aspects merit detailed consideration. The standard access for interventions on the right subclavian artery is the right femoral or right radial artery [6]. However, in this patient, marked tortuosity of the proximal right subclavian artery made antegrade device delivery unpredictable and potentially risky. A balloon-expandable stent was chosen over a self-expanding stent for three reasons: (1) precise ostial implantation to avoid covering the common carotid artery origin; (2) high radial force to counteract elastic recoil in calcified or fibrous lesions; and (3) controlled expansion allowing accurate positioning with minimal vessel wall injury. Although self-expanding stents are sometimes used for longer and more tortuous lesions, their radial force is lower, and they are less suitable for ostial stenoses with high recoil risk [7]. Recent reports describe success with self-expanding stents in anomalous vessels such as an aberrant right subclavian artery [8]; however, for typical atherosclerotic ostial lesions, balloon-expandable devices remain the standard of care [9]. The patient had angiographically confirmed subclavian-

vertebral steal syndrome with retrograde flow in the right vertebral artery. Restoration of antegrade flow was achieved immediately after stenting – a well-documented phenomenon that predicts clinical success [2]. Although distal cerebral protection systems are increasingly used in carotid interventions, their role in subclavian stenting remains debated. In this case, the absence of thrombotic debris and the short stenotic segment allowed stenting without protection, consistent with data indicating low embolic risk in stable ostial lesions [10]. Our results align with those of Gavrilenko et al. [4], who reported 98% technical success of subclavian stenting with minimal complications. The procedure time and hospital stay in our case are consistent with averages for endovascular interventions, which are significantly shorter than for open surgery [4, 5]. The 2024 ESC guidelines support revascularisation for symptomatic subclavian artery disease (Class IIa, Level B), without preference for any specific method, leaving the choice to the operator based on anatomy and patient risk profile [3]. Our observation confirms that stenting is a viable first-line method in appropriately selected patients.

Conclusion

This clinical case demonstrates that critical stenosis of a tortuous subclavian artery can be safely and effectively treated with endovascular stenting provided an individualised approach is adopted. Key technical aspects include: (1) choosing contralateral access to overcome unfavourable anatomy; (2) using a balloon-expandable stent for precise ostial implantation; and (3) recognising that cerebral protection is not always mandatory in stable, non-thrombotic lesions. This strategy offers a minimally invasive, effective solution for symptomatic patients,

particularly those at high surgical risk and with multifocal atherosclerosis.

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