

SUBCLAVIAN STEAL SYNDROME PRESENTING WITH INTER-ARM BLOOD
PRESSURE DIFFERENCE, HEADACHE AND DIZZINESS: A DIAGNOSTIC CASE
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ABSTRACT

Background: Subclavian artery stenosis can produce a clinically important discrepancy in blood pressure and pulse between the upper limbs. When vertebral artery flow is diverted to supply the affected arm, the resulting subclavian steal phenomenon may produce vertebrobasilar symptoms and can be overlooked when the presentation is dominated by hypertension or headache. **Case presentation:** A patient with a history of hypertension presented with uncontrolled blood pressure, intermittent headache and dizziness for approximately three months. A significant difference in blood pressure between the two upper limbs was documented, with associated pulse asymmetry. The patient also described right upper-limb weakness or heaviness during strenuous activity. There was no documented history of transient ischemic attack or stroke, and neurological examination did not demonstrate a focal deficit, gait abnormality or cerebellar signs. Vascular evaluation was consistent with subclavian steal physiology. The patient improved clinically after blood-pressure control. Endovascular angioplasty was advised but declined. **Conclusion:** A substantial inter-arm blood pressure difference should prompt careful vascular assessment rather than being attributed solely to difficult-to-control hypertension. Subclavian steal syndrome may be clinically subtle, and recognition of the pulse and blood-pressure discrepancy can provide the key bedside clue.

KEYWORDS: Subclavian steal syndrome; subclavian artery stenosis; inter-arm blood pressure difference; vertebrobasilar insufficiency; dizziness; hypertension; vascular Doppler.

INTRODUCTION

Subclavian steal syndrome is a manifestation of proximal subclavian artery obstruction in which reduced distal pressure may reverse blood flow in the ipsilateral vertebral artery, allowing blood to be diverted toward the upper limb. The clinical spectrum ranges from an asymptomatic inter-arm blood-pressure difference to exertional arm symptoms and vertebrobasilar manifestations such as dizziness, imbalance, visual symptoms or syncope. The diagnosis requires correlation of bedside vascular findings with appropriate vascular imaging.

The present case is clinically important because the patient initially presented with uncontrolled hypertension

and headache, while the major diagnostic clue was the marked difference in blood pressure between the two arms. It illustrates the value of bilateral blood-pressure measurement and pulse examination in patients with unexplained or resistant blood-pressure abnormalities.

CASE PRESENTATION

The patient had a history of hypertension for approximately five years and was taking regular antihypertensive therapy. The patient presented with uncontrolled hypertension associated with intermittent headache and dizziness of approximately three months' duration. A marked difference in blood pressure between the two upper limbs was identified during evaluation. The exact higher-pressure side was not consistently

documented in the available clinical record; therefore, the side of the higher reading is not specified here rather than being inferred.

The patient also reported weakness/heaviness of the right upper limb particularly while lifting a heavy object. There was no documented history of transient ischemic attack or previous stroke. On neurological assessment, no definite focal neurological deficit was identified. Gait was not abnormal and cerebellar signs were not documented.

The cardiovascular and vascular examination raised suspicion of proximal upper-limb arterial disease because of the inter-arm blood-pressure and pulse discrepancy. This prompted vascular imaging and evaluation for subclavian steal physiology.

INVESTIGATIONS

A detailed vascular evaluation was performed because of the marked inter-arm blood pressure discrepancy and associated pulse asymmetry. The initial vascular assessment included bilateral upper-limb blood pressure measurement, pulse examination, carotid colour Doppler and CT angiographic evaluation of the upper-limb arterial circulation.

Carotid Colour Doppler

Carotid colour Doppler demonstrated mild diffuse atherosclerotic changes. The bilateral common carotid arteries, carotid bulbs, external carotid arteries and internal carotid arteries were without significant luminal stenosis.

Importantly, spectral Doppler assessment demonstrated reversal of blood flow in the right vertebral artery, suggesting a right subclavian steal phenomenon. The left vertebral artery demonstrated normal antegrade cephalad flow with normal peak systolic velocity. No critical stenosis was identified in the bilateral carotid arteries. These findings provided an important physiological correlate for the clinical suspicion of subclavian steal syndrome (Figure 1).

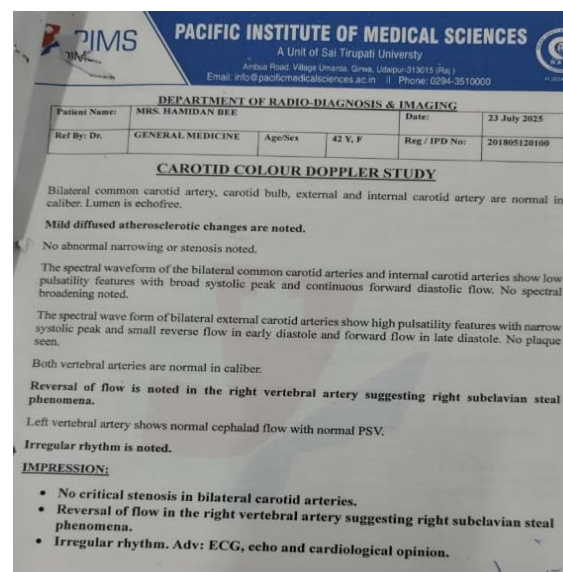


Figure 1. Carotid colour Doppler study.

Carotid colour Doppler demonstrating reversal of flow in the right vertebral artery, suggestive of right subclavian steal phenomenon. Mild diffuse atherosclerotic changes were noted without critical stenosis of the bilateral carotid arteries.

Source: Original investigation of the patient.

CT Angiography of the Upper Limbs

CT angiography of both upper limbs was subsequently performed for anatomical assessment of the suspected subclavian arterial lesion.

The study demonstrated a calcified atherosclerotic plaque with a non-enhancing filling defect involving the proximal right subclavian artery, extending for approximately 1.3 cm and producing marked luminal narrowing/near-complete luminal compromise. The report described these findings as suggestive of atherosclerotic plaque with thrombus involving the proximal right subclavian artery.

The left subclavian artery showed normal origin, course and calibre. The axillary, thoraco-acromial, lateral thoracic, subscapular, anterior and posterior circumflex humeral arteries appeared normal. The brachial artery and its branches demonstrated normal bifurcation into the radial and ulnar arteries, while the radial, ulnar, common interosseous, anterior and posterior interosseous arteries were reported to be normal in course and calibre.

The CT angiographic findings provided the anatomical correlate for the abnormal vertebral flow pattern observed on Doppler and supported the diagnosis of right subclavian arterial disease with subclavian steal physiology (Figure 2).



Figure 2: CT angiography of the bilateral upper limbs.

CT angiographic imaging demonstrating significant proximal right subclavian arterial disease with a calcified atherosclerotic plaque and non-enhancing filling defect causing marked luminal narrowing. The left subclavian and distal upper-limb arterial circulation were reported to be normal.

Source: Original investigation of the patient.

Integration of Vascular Findings

Taken together, the clinical finding of a marked inter-arm blood pressure difference and pulse asymmetry, reversal of right vertebral artery flow on Doppler, and CT angiographic evidence of significant proximal right subclavian arterial disease established a strong clinico-radiological correlation for right subclavian steal syndrome.

The absence of documented focal neurological deficit, gait abnormality or cerebellar signs indicated that the patient had not developed a clinically established stroke at the time of evaluation.

ELECTROCARDIOGRAPHY AND CARDIAC EVALUATION

ECG and cardiac assessment were performed as part of the evaluation. No cardiac explanation was identified for the presenting neurological/vascular symptoms in the available case record.

NEUROLOGICAL ASSESSMENT

There was no documented focal neurological deficit, gait abnormality or cerebellar syndrome. This supported a vascular presentation without established stroke at the time of evaluation.

DIAGNOSIS

Based on the clinical finding of a significant inter-arm blood-pressure difference, pulse asymmetry, exertional upper-limb symptoms and vascular imaging consistent with subclavian steal physiology, the working diagnosis was **subclavian steal syndrome secondary to**

subclavian arterial disease presenting with headache, dizziness and difficult-to-control hypertension.

MANAGEMENT AND OUTCOME

Antihypertensive treatment was continued/optimized. The documented medication regimen included telmisartan/amlodipine/chlorthalidone combination therapy, metoprolol extended release, prazosin, anticoagulant therapy and aspirin/statin combination therapy as recorded in the clinical notes. Blood pressure subsequently improved and the patient reported clinical improvement.

Because of the underlying vascular lesion and the risk of recurrent symptoms, angioplasty/revascularization was advised. The patient declined the proposed angioplasty. The patient was discharged after clinical improvement with advice for continued medical management and vascular follow-up.

DISCUSSION

The hallmark bedside clue in this case was the marked difference in blood pressure between the two arms. Proximal subclavian stenosis can reduce pressure distal to the lesion, producing an apparent low blood pressure in the affected arm. In the presence of vertebral-flow reversal, upper-limb exertion may increase the demand for blood flow and accentuate diversion of blood through the vertebral circulation.

Patients may therefore present with a combination of upper-limb exertional symptoms and vertebrobasilar complaints. Dizziness and headache are nonspecific symptoms, and their association with uncontrolled hypertension can lead to an initial focus on blood-pressure treatment alone. The vascular examination is essential because a substantial inter-arm pressure difference is an important clue to proximal arterial disease.

The diagnosis should be established by integrating clinical findings with non-invasive vascular imaging. Duplex ultrasonography can identify altered vertebral flow and provide evidence of subclavian stenosis, while cross-sectional angiographic imaging can define the anatomy and severity of the lesion. In symptomatic patients, revascularization may be considered depending on lesion anatomy, symptom burden and overall vascular risk.

This case also emphasizes that absence of a completed stroke does not exclude clinically relevant subclavian steal physiology. Early recognition provides an opportunity for vascular risk-factor modification and appropriate referral before recurrent vertebrobasilar or upper-limb ischemic symptoms develop.

CONCLUSION

This case demonstrates how a simple bedside finding—an appreciable difference in blood pressure between the

two arms—can uncover clinically significant subclavian arterial disease. Subclavian steal syndrome should remain in the differential diagnosis of patients with inter-arm blood-pressure discrepancy, dizziness and exertional upper-limb symptoms. Early vascular recognition and appropriate management may prevent recurrent symptoms and cerebrovascular complications.

ACKNOWLEDGEMENTS

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ETHICAL CONSIDERATIONS AND PATIENT CONSENT

Written informed consent for publication of the clinical information and relevant investigation images was obtained from the patient.

The manuscript has been prepared with appropriate protection of patient identity and confidentiality.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest related to this case report.

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