# Incidental Vascular Pathology: A Case of Subclavian Artery Occlusion Detected Through Carotid Ultrasound in an Acute Stroke Patient

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## Introduction

Ultrasound of the extracranial arteries is crucial in the assessment of patients with acute stroke symptoms, as it helps to identify significant disease that could contribute to cerebral ischemia. Additionally, it can also reveal incidental pathologies that may influence patient management and prognosis. This case report presents a patient with subclavian artery occlusion and a rare anatomical variation where the left vertebral originates directly from the aortic arch.

## Background

A 79-year-old female presented with acute onset of right facial droop, dysarthria, and dysphasia, prompting an ultrasound assessment of her extracranial arteries.

## Ultrasound Imaging

The ultrasound assessment revealed significant left internal carotid disease along with monophasic waveforms in the left subclavian artery, indicating significant proximal subclavian disease (Figure 1).

Despite this, the left vertebral artery showed normal antegrade flow, contrary to the expected subclavian steal phenomenon (Figure 2). Furthermore, a prominent collateral vessel adjacent to the left vertebral artery was identified, displaying retrograde flow (Figure 3), though its origin could not be fully traced during the ultrasound scan.

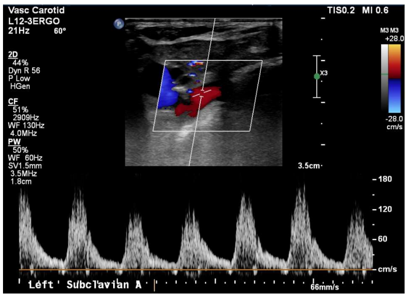


Figure 1. Monophasic waveforms in the left subclavian artery indicating proximal disease.

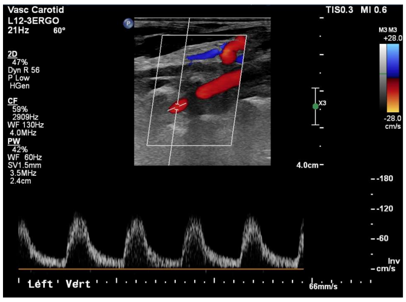


Figure 2. Antegrade flow in the left vertebral artery.

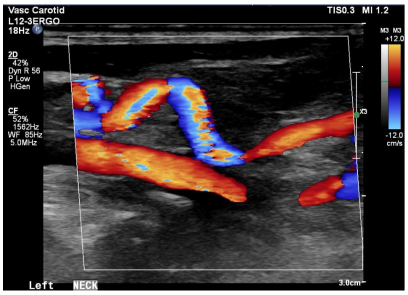


Figure 3. Large collateral seen lying adjacent to the left vertebral artery displaying retrograde flow.

## Discussion

Further investigation with computed tomography (CT) imaging identified an anatomical variation in which the left vertebral artery originated directly from the aortic arch, rather than from the left subclavian artery (Figure 4). CT also confirmed an occlusion at the origin of the left subclavian artery. The collateral vessel observed on ultrasound was determined to originate from the left vertebral artery, supplying flow to the subclavian artery beyond the occlusion.

This anatomical variation is the third most common aortic arch variation (Figure 5), with a reported prevalence of around 2.8% (Onrat et al, 2021; Popieluszko et al, 2018). This explains the absence of the expected haemodynamics associated with subclavian steal. Since the vertebral artery originated directly from the aortic arch, its flow was unaffected by the subclavian artery occlusion, preserving normal antegrade flow and the collateral vessel compensated for the occlusion, supplying flow to the subclavian artery.

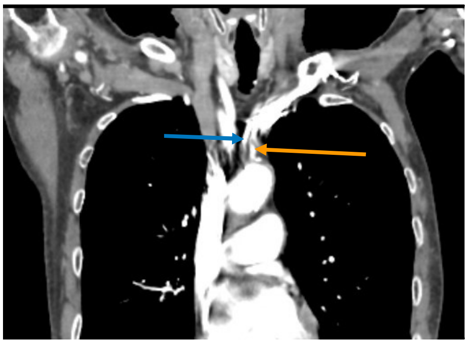

Figure 4. CT angiogram showing anomalous origin of the left vertebral artery (orange arrow) from the aortic arch adjacent to the left common carotid artery (blue arrow).

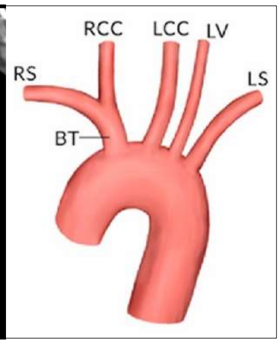


Figure 5. Aortic arch variation where left vertebral artery originates from the aortic arch (Popieluszko et al, 2018).

## Conclusion

This case highlights the importance of thorough carotid artery scanning as it can detect incidental findings that may have significant clinical implications. The identification of a collateral vessel compensating for the subclavian artery occlusion illustrates the complexity of vascular pathologies that can be encountered.

Moreover, this case demonstrates how anatomical variations can alter haemodynamic flow, highlighting the value of integrating ultrasound with other imaging modalities to achieve comprehensive diagnostic insight and guide appropriate patient management.

## Learning Points

**1.** Understanding the haemodynamics of the extracranial arteries and recognising aortic arch variations are critical for accurate diagnosis and management.

**2.** Subclavian steal phenomenon can occur via collateral pathways from the vertebral artery, especially in cases involving anatomical variants.

## References

Onrat, E, Uluışık, IE & Ortug, G (2021)The left vertebral artery arising directly from the aortic arch. Translational Research in Anatomy, vol. 24, 100122.

Popieluszko P, Henry BM, Sanna B, Hsieh WC, Saganiak K, Pękala PA, Walocha JA, Tomaszewski KA. (2018) A systematic review and meta-analysis of variations in branching patterns of the adult aortic arch. Journal of vascular surgery, 68(1), 298–306.e10.