



UNIVERSITY of
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MEDICAL CENTER

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DEPARTMENT OF IMAGING SCIENCES

Imaging Sciences Interesting Cases

CASE 31

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CLINICAL PRESENTATION: Patient with transient right upper extremity weakness.

IMAGING FINDINGS:

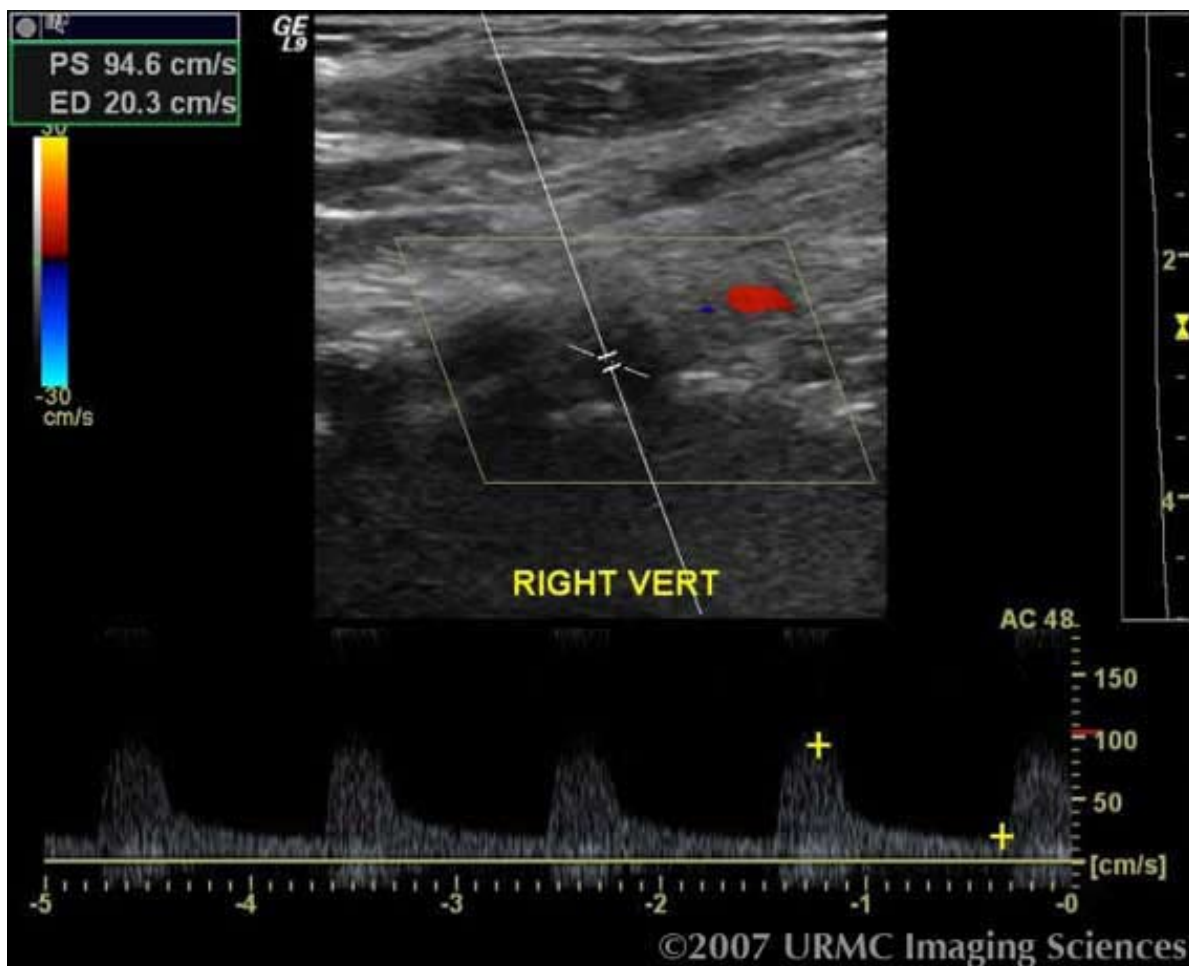


Figure 1 - Color duplex ultrasound with signal from the right vertebral artery shows a high resistance wave form with antegrade flow.

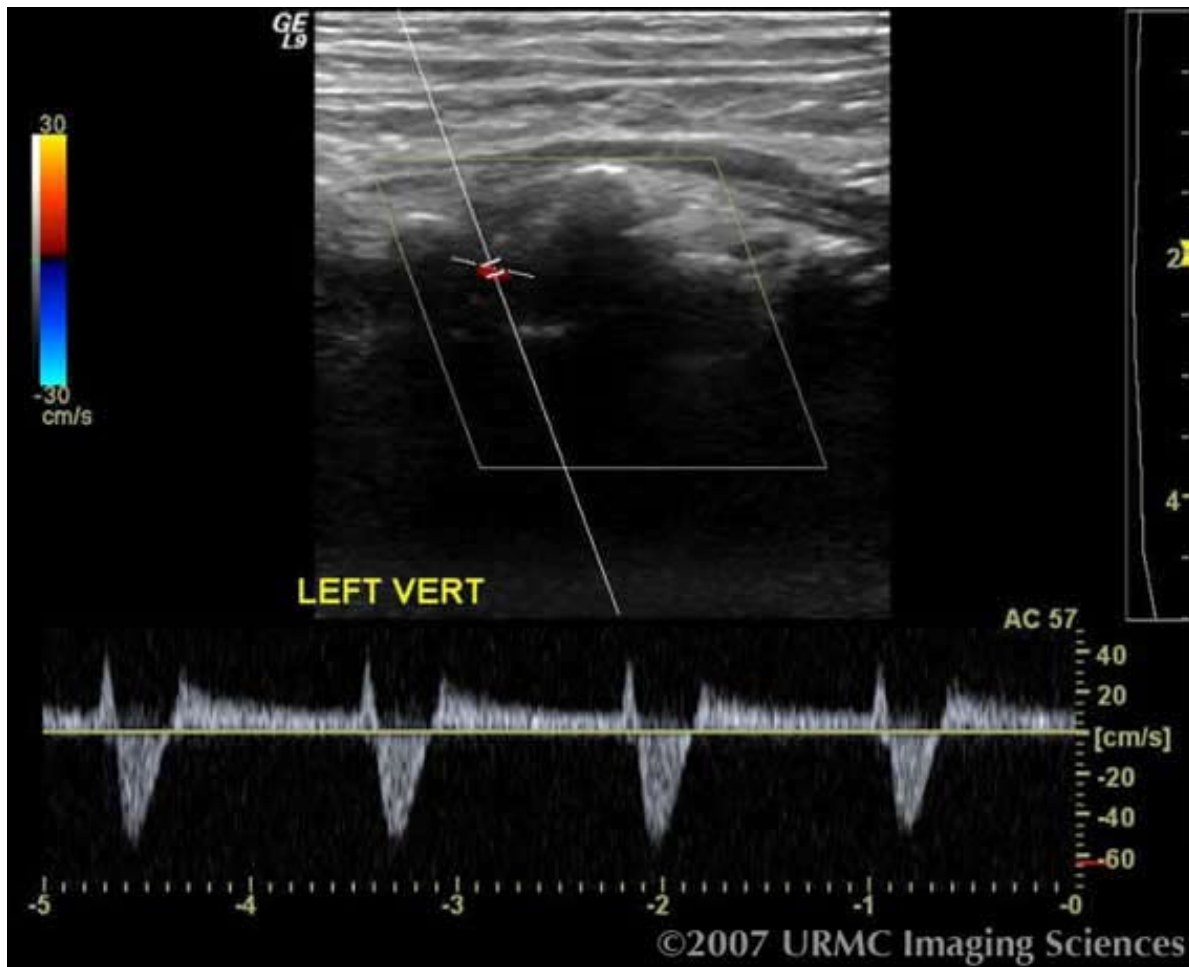


Figure 2 - Color duplex ultrasound with signal from the left vertebral artery shows a biphasic signal with retrograde systolic flow.

DIAGNOSIS: Left subclavian steal

DISCUSSION: Subclavian steal phenomenon is reversal of flow or intermittent retrograde flow in the vertebral artery secondary to a stenosis or blockage in the proximal subclavian artery. Predominantly a result of atherosclerosis, subclavian steal phenomenon can also be caused by a cervical rib. Subclavian steal syndrome includes steal phenomenon with neurologic symptoms such as presyncope, syncope, and/or focal neurologic deficits. Patients with subclavian steal phenomenon are usually asymptomatic.

Normal blood flow to the posterior circulation follows the path of least resistance by traveling through aorta, subclavian, and vertebral arteries to reach the brain. The stenosis in the proximal subclavian artery can vary in its severity with mildly reduced flow to complete occlusion. As a result blood travels up the vertebral contralateral to the lesion then retrograde in the ipsilateral vertebral to reach the distal subclavian artery. Approximately 85% of subclavian steal are on the left but it can occur on the right.

Subclavian steal is classified as persistent or intermittent. When the steal phenomenon is persistent there is most likely a total occlusion of proximal subclavian. Intermittent steal occurs only when the extremity is exercised and is most likely caused by a subtotal occlusion.

Subclavian steal is diagnosed with Doppler ultrasound by showing complete reversal or biphasic flow in the vertebral artery ipsilateral to the lesion with antegrade flow in the contralateral vertebral. Using a tourniquet, upper extremity hyperemia can be induced to reproduce exercise induced subclavian steal during a diagnostic examination. Increased velocity (>60 cm/sec) in the contralateral vertebral artery from demand flow, reversal of flow in the internal thoracic artery, or high velocity in the affected subclavian artery may also be seen. Other modalities such as CTA, MRA, and DSA are used for pre-op assessment. Treatment

for symptomatic patients can include stenting, balloon angioplasty, or endarterectomy.

REFERENCES:

1. Krutz A, Middleton W. Ultrasound: The Requisites. St. Louis: Mosby 1996.
2. Kliewer MA, Hertzberg BS, Kim DH, Bowie JD, Courneya DL, Carroll BA. Vertebral artery Doppler waveform changes indicating subclavian steal physiology. AJR Am J Roentgenol. 2000 Mar;174(3):815-9. [PubMed]