

Is anomalous origin of the left vertebral artery indeed a rare finding?

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We present a pictorial review of anomalous origin of the left vertebral artery observed in 5 patients imaged in our after-hours trauma radiology unit within a period of 7 days. We raise the question of whether the incidence of anomalous origin of the left vertebral artery quoted in the radiology literature as 5% is really that low, and suggest that the current increased frequency of cross-sectional imaging could elevate the observed incidence of this anomaly in practice. We discuss the implications of vertebral artery anomalies in the endovascular treatment of aortic arch injuries.

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The incidence of anomalous origin of the left vertebral artery from the aortic arch ranges between 1% and 5.8%.^{1,2} This anomaly has important implications for thoracic surgery and interventional procedures.

The left vertebral artery may originate from:

- the left common carotid artery
- the root of the left subclavian artery close to the aortic arch, or
- directly from the aortic arch.

In addition, there may also be doubling of the vertebral arteries.¹

There are complications associated with anomalous vertebral artery origin; these include:

- atherosclerosis at the anomalous vertebral artery origin
- increased likelihood of dissection
- absence of the left inferior thyroid artery
- abnormal haemodynamics with intracranial complications.²

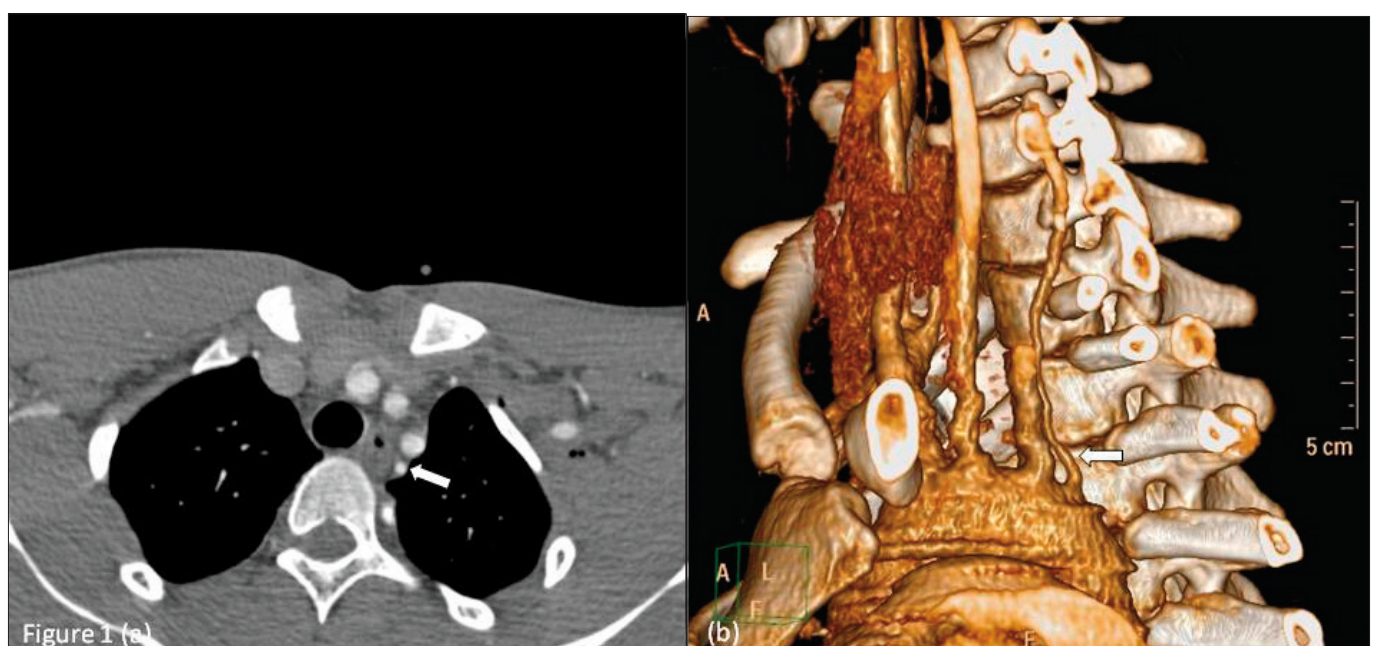


Fig. 1. (a) CT angiogram (b) and 3D reconstruction. The left vertebral artery (white arrows) with anomalous origin from the aortic arch distal to the left subclavian artery was demonstrated in one patient.

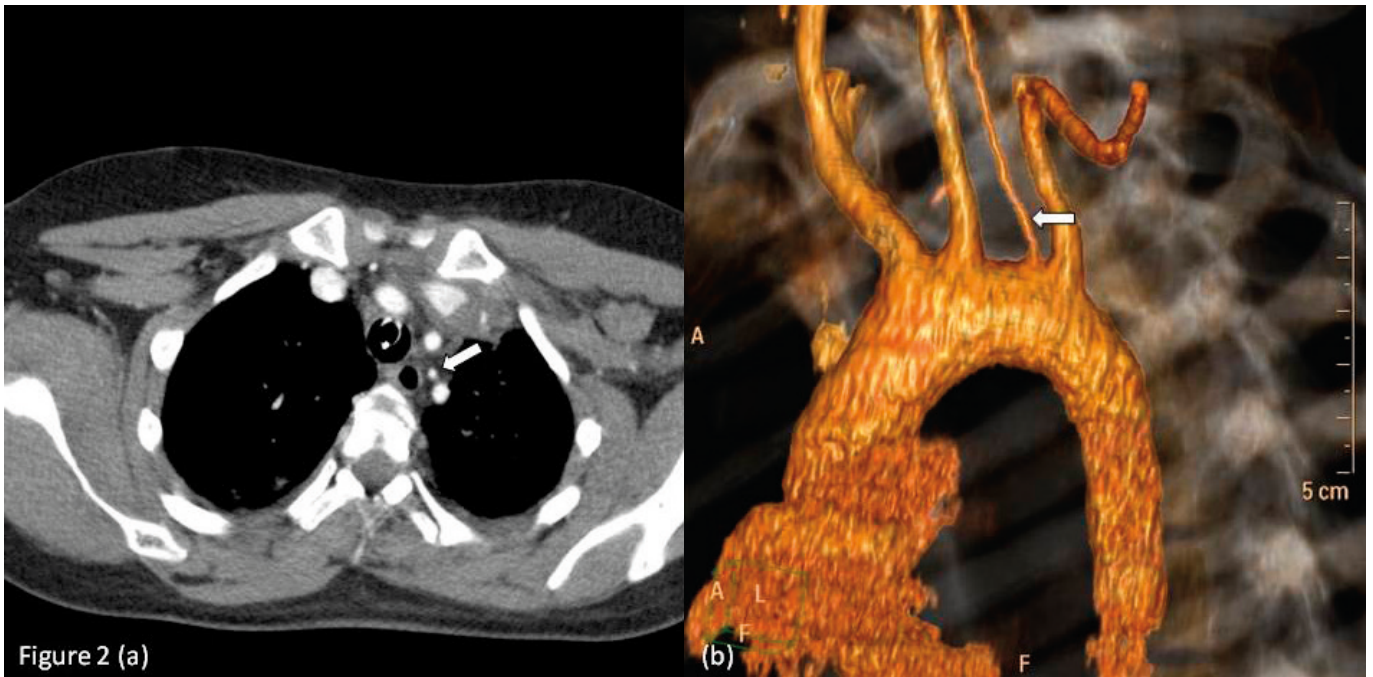


Figure 2. (a) CT angiogram and (b) 3D reconstruction. Left vertebral artery (white arrows) arising from the aortic arch between the left carotid and the left subclavian arteries was demonstrated in 4 patients.

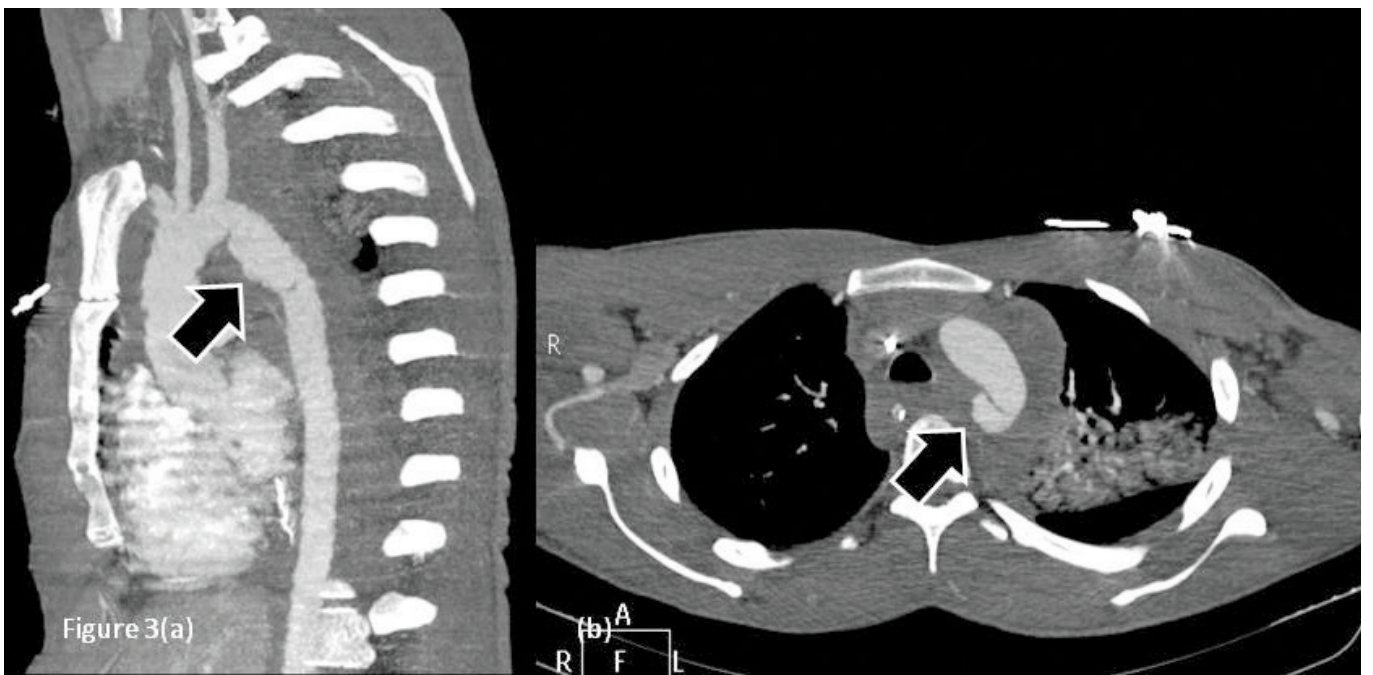


Figure 3. CT angiography of the chest demonstrating a contained false aneurysm at the aortic isthmus (black arrows) in the (a) sagittal and (b) axial planes.

During a one-week period, we observed 5 patients with an anomalous origin of the left vertebral artery. They were all imaged in our after-hours radiology unit. Four patients had CT angiography for penetrating neck trauma, and 1 patient had CT angiography of the chest for blunt trauma. Figs 1 - 4 demonstrate the anomalous vertebral arteries and some of the complications encountered.

Discussion

The cluster of cases observed in our unit within such a short period raised the following questions:

- Was this cluster of cases entirely random and incidental?
- Is the incidence of anomalous origin of the left vertebral artery possibly higher than the reported 5%?
- Could the current increased frequency of cross-sectional imaging play a role in the suspected (but yet unconfirmed) increased radiological observation of this anomaly?

We consider prospective reporting of anomalous origin of the left vertebral artery to be important as the anomaly has significant clinical and surgical implications during endovascular treatment of aortic arch injuries and during angioplasty and stent procedures in conditions such

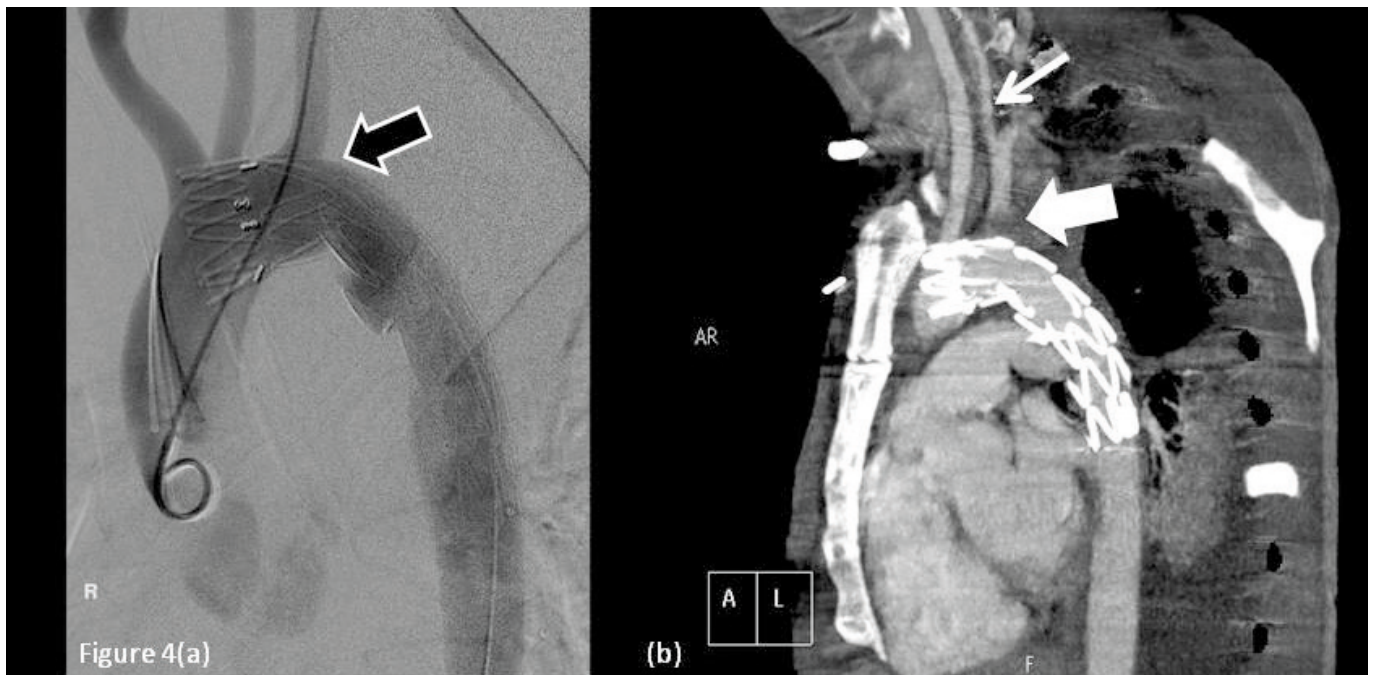


Fig. 4. (a) Digital subtraction angiography demonstrating a covered endovascular stent within the aortic arch which covers the left subclavian artery origin (black arrow). (b) Follow-up CT angiography in the same patient demonstrating a hypodense thrombus (large white arrow) at the left subclavian artery origin. The left subclavian artery is perfused from the left vertebral artery (small white arrow), i.e. the subclavian steal phenomenon.

as aortic coarctation. Stent coverage of the left subclavian origin in such procedures results in perfusion of the left subclavian artery by way of the subclavian steal phenomenon from a normally positioned left vertebral artery, as demonstrated in Fig. 4b.

However, when a patient who has an anomalous left vertebral artery (i.e. vertebral artery origin from the aortic arch) requires endovascular treatment, stent coverage can occlude the left vertebral artery origin. This will preclude the subclavian steal phenomenon from occurring so as to perfuse the left subclavian artery; consequently, surgical re-implantation of the left subclavian artery to the left carotid artery would be mandatory.

Conclusion and teaching point

Anomalous origin of the left vertebral artery could be more prevalent than reported in the literature, but a larger cohort is required to

confirm this suspicion. We are of the view that the accurate prospective radiological reporting of this anomaly is important, especially in the context of endovascular stent procedures of aortic arch lesions, as the left subclavian artery perfusion would in such cases depend on the subclavian steal phenomenon from a normal left vertebral artery. The presence of an anomalous left vertebral artery would require left subclavian re-implantation in such patients.

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