DOI: 10.7860/JCDR/2022/56325.16705

Case Report

Radiology Section

Dual Origin of Left Vertebral Artery- A Case Report of an Uncommon Vascular Variant

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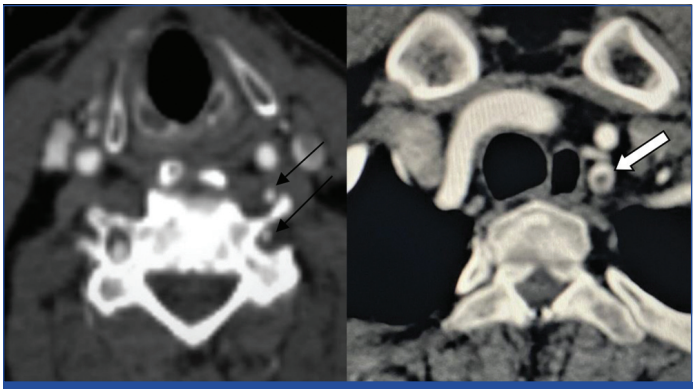
ABSTRACT

Vertebral artery duplication is relatively an uncommon vascular variant. It is a developmental anomaly with a dual origin and has different levels of fusion in the neck. It is usually an incidental finding found during workup of other clinical conditions. Due to its anatomical similarity with arterial dissection, it is often misinterpreted on vascular imaging, so a thorough understanding of this vascular variant is necessary to avoid diagnostic and therapeutic complications during endovascular interventions. A 43-year-old male presented with complaints of pain and discolouration of fingers of left hand since two days. Computed Tomography (CT) angiography of upper limb was done which revealed short segment near complete to complete occlusion/thrombosis of proximal left subclavian artery which was seen 8 mm from its origin with distal reformation by the collaterals. There was an evidence of hypoplastic V1 segment of native left vertebral artery, a small artery was seen arising from the aortic arch in the middle of common carotid and left subclavian artery origins, which was found to be duplicated vertebral artery with dual origin from both the subclavian artery and aorta with fusion of both the limbs at C4-C5 levels.

Keywords: Computed topographic angiography, Common carotid, Duplicated left vertebral artery, Left subclavian artery

CASE REPORT

A 43-year-old male presented with complaints of pain and discolouration of fingers of left hand since two days. Computed Tomography (CT) angiography of upper limb was done which revealed short segment near complete to complete occlusion/thrombosis of proximal left subclavian artery [Table/Fig-1] for a length of approximately 13 mm, seen 8 mm from its origin with distal reformation by the collaterals and hypoplastic V1 segment of left native vertebral artery and a small artery was seen arising from the aortic arch in the middle of common carotid and left subclavian artery origins which was found to be duplicated vertebral artery with dual origin from both the subclavian artery and aorta [Table/Fig-2] with fusion of both limbs at C4-C5 level [Table/Fig-3]. The patient was conservatively managed with Tab. Clop tap-A (75 mg) (antiplatelet) once a day for six months, Tab. Aerosol-p (analgesic) thrice a day for two weeks and counseled against smoking and on follow-up visit after six months patient was found to be symptom free and stable.

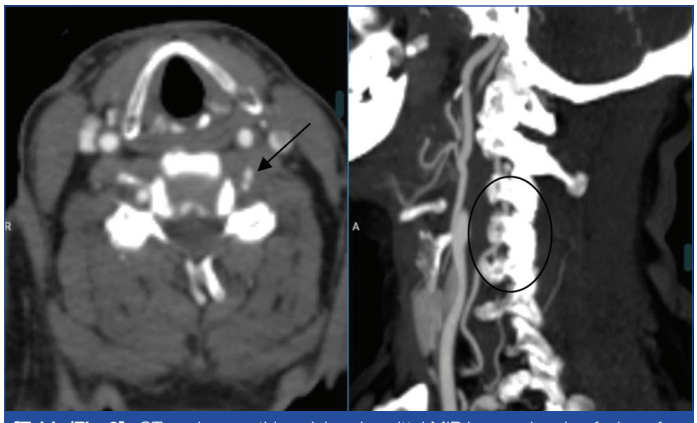


[Table/Fig-1]: Computed Tomography (CT) angiogram axial image showing anterio posteriorly duplicated left vertebral artery (black arrows). Second image showing central near complete to complete thrombus in proximal segment of left subclavian artery (white arrow).

DISCUSSION

Vertebral artery duplication implies dual origin of vertebral artery most commonly from arch of aorta and subclavian artery with fusion at neck level. In 5% of instances, an aberrant origin of vertebral artery can occur directly from the aortic arch [1-3]. The abnormal origin of the vertebral artery is known to exert haemodynamic changes and intracranial abnormalities.

[Table/Fig-2]: CT angiogram sagital Maximum Intensity Projection (MIP) and sagital volume rendering image showing anomalous vertebral artery origin (arrows) arising from aortic arch between the left subclavian artery and left common carotid artery.



[Table/Fig-3]: CT angiogram thin axial and sagittal MIP image showing fusion of left dual origin vertebral arteries at C4-C5 level (arrow and oval).

Embryology

Vertebral arteries develop embryo logically from the anastomosis of cervical intersegmental branches. Except for the seventh branch, which gives birth to the subclavian and vertebral arteries, all cervical

Author	Year of publication	Study/Incidence	Complications
Satti SR et al., [1]	2007	Showed a case of partially duplicated right vertebral artery and revealed that dual origin of vertebral artery is more common on the left side.	-
Kendi AT and Brace JR [3]	2009	Described a case of a dual origin of vertebral artery with an intracerebral aneurysm.	Intracerebral aneurysm -Anomalous vertebral artery origins affects the hemodynamics and may lead to intracranial malformation.
Dare AO et al., [7]	1997	Duplication of the right proximal vertebral artery.	Extensive vertebrobasilar arterial dissection after sexual intercourse.
Melki E et al., [8]	2012	Showed a case of dissection of the medial limb of the duplicated right vertebral artery after a minor neck trauma.	Cerebellar vermis acute infarct.
Kim MS [9]	2017	Computed Tomography (CT) angiography revealed 0.29% incidence of this variant in 10 out of 3386 patients.	-
Mahmutyazicioğlu K et al., [10]	1998	Duplicated left vertebral artery revealed occlusion in one limb.	This occlusion was also found on doppler ultrasonography and was treated conservatively.
Panicker HK et al., [11]	2002	Showed incidence of 0.5% of this variant in cadavers of middle aged females.	-
Present study	2022	Incidentally detected small artery was seen arising from the aortic arch in the middle of common carotid and left subclavian artery origins which was found to be duplicated vertebral artery with dual origin from both the subclavian artery and aorta with fusion of both limbs at C4-C5 level.	-

[Table/Fig-4]: Review of literature [1,3,7-11].

segments eventually regress, the persistence of these branches predisposes to abnormal variations. The fifth cervical branch can sometimes fail to regress and unite with the seventh cervical branch, resulting in vertebral artery duplication [1].

To avoid inadvertent vessel injury during endovascular interventions and spinal surgeries, a thorough knowledge of this variant is required.

Vertebral arteries usually enter the transverse foramen of C6 vertebrae. Nevertheless, when the left vertebral artery originates from arch of aorta, it usually reaches the C4-C5 vertebrae transverse foramen rather than transverse foramen of C6 vertebra [4]. During vertebral artery duplication, one limb may arise from the subclavian artery, while the other may arise either from the arch of aorta, or thyrocervical trunk, innominate trunk, subclavian artery. In extremely rare cases, two limbs of a duplicated left vertebral artery arises from the arch of aorta. The left fourth and fifth intersegmental arteries often branch out from a stem artery that arises from the arch of aorta. The medial limb of the duplicated vertebral artery usually enters the transverse foramen of higher cervical vertebrae, which is consistent with the concept of intersegmental vascular regression failure and is caused by intersegmental arteries that follow the cervical nerve roots [5].

Clinical implications of dual origin of vertebral artery:

1. The limb which is arising from arch of aorta is little longer in length than the other limb arising from subclavian artery hence the risk of atherosclerosis is high in the former limb.
2. Incidence of dissection in duplicated vertebral artery of aortic origin is more than the subclavian origin.
3. Because dual origin can rarely mimic vertebral artery dissection so can be misinterpreted as vertebral artery dissection [6].

In a previous literature, two cases of dual origin of the vertebral artery with dissection have been documented [Table/Fig-4] [1,3,7-11].

CONCLUSION(S)

Although, dual origin of the vertebral artery is usually an uncommon vascular variant, needs special mention because this variant has got implications with regards to haemodynamics, angiography, endovascular and surgical interventions. Hence, surgeons should be aware of this variant during lower cervical anterior surgery, carotid endarterectomy or other head and neck procedures to prevent damage to the vertebral artery.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Mar 22, 2022
- Manual Googling: May 16, 2022
- iThenticate Software: Jul 20, 2022 (14%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Mar 13, 2022**
Date of Peer Review: **Apr 27, 2022**
Date of Acceptance: **May 17, 2022**
Date of Publishing: **Aug 01, 2022**