Anomalous Origin of Right Vertebral Artery from Right External Carotid Artery

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ABSTRACT
A 50 years old male was admitted with sub-arachnoid haemorrhage. Angiographic examination revealed an abnormal origin of the right vertebral artery from the right external carotid artery. Multiple variations in the origin of right vertebral artery have been reported in literatures. Anomalous origin of the right vertebral artery from the right external carotid artery has not been reported earlier.

Key words: Anomalous right vertebral artery. External carotid artery. Angiography. Sub-arachnoid haemorrhage.

INTRODUCTION
The vertebral artery arises from the superior surface of the subclavian artery and provides the main blood supply to the posterior fossa structures. Variation in vertebral artery origin is a congenital anomaly that develops during embryonic development.¹ Multiple variations in the origin of vertebral artery have been reported in literature. A thorough identification of anomalous origin of vertebral artery is paramount when performing both diagnostic and interventional angiography. If the vertebral arteries are not identified in their normal position, this can be misinterpreted as the vessel being congenitally absent. This information is important for endovascular or cardiothoracic surgeries in head and neck region. This has become more important in the era of carotid artery stents, vertebral artery stents and new therapeutic options for intracranial interventions. The present case report describes a hitherto unreported anomalous origin of vertebral artery.

CASE REPORT
A 50 years old hypertensive and diabetic male was admitted with loss of consciousness since one day. He also had history of severe headache for the last 5 days. GCS (Glasgow coma scale) at the time of admission was 7/15 (E=4, M=2, V=1). Computed tomography images showed SAH (sub-arachnoid haemorrhage). The clinical and radiological findings revealed the need for angiography to rule out ruptured berry aneurysm, as a cause of SAH. Digital subtraction angiography (DSA) was performed by using uniplaner angiographic equipment. Selective catheterization of right common carotid artery demonstrated the anomalous origin of right vertebral artery from right external carotid artery (Figure 1A). The right external carotid artery was selectively catheterized to further confirm the diagnosis of anomalous origin (Figure 1B). Super selective catheterization of right vertebral artery was done which showed reflux of contrast in the occipital artery which is a branch of right external carotid artery (Figure 1C). The intracranial study revealed the presence of small anterior communicating artery aneurysm (Figure 1D). The right external carotid artery was not identified in its normal position. Selective left vertebral angiography showed hypo-plastic left vertebral artery. The anatomic relationship of rest of the supraaortic arteries was confirmed to be normal.

The patient was operated craniotomy and clipping of anterior communicating artery aneurysm was done. Few days thereafter, the patient improved symptomatically and was discharged home.

DISCUSSION
The most frequent variant of vertebral artery origin (2.4-5.8%) is the left vertebral artery arising from the aortic arch between left common carotid artery and left subclavian artery.² An anomalous origin of right vertebral artery is rare and is divided into three categories: first, those originating directly from the aorta; second, those originating from the carotid arteries; and third, those with duplicated origin.² In a landmark literature review in 1999, Lekme et al. found 9 cases in which the right vertebral artery originated from the aortic arch; 3 cases in which right vertebral artery originated from the brachiocephalic artery; 16 cases of right vertebral artery...
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In most of the cases reported in literature, anomalous origin of the vertebral artery did not result in clinical symptoms. Anecdotally, altered haemodynamics cause turbulent flow, which may predispose the patient to aneurysm formation and therefore, increases the risk of cerebrovascular accidents. Endovascular therapy of intracranial aneurysm can be performed before they present clinically as subarachnoid haemorrhage or by mass effect and therefore, decreases morbidity and mortality.

In this case, the patient presented with sub-arachnoid hemorrhage and angiography revealed an anomalous origin of right vertebral artery with a co-existent anterior communicating artery aneurysm. A detailed information of variations in the vertebral artery origin is crucial for the vascular surgery in the head and neck region and in cases of diagnostic four vessel angiography. For cases in which the vertebral artery originates from carotid artery or its branches, the ligation of the common carotid artery may cause a compromise of the posterior fossa blood supply. During diagnostic cerebrovascular imaging one or both vertebral arteries may be wrongly assumed to be occluded or diseased, either by eluding catheterization during angiography or by lying outside the region of interest during non-invasive studies such as CT angiography, MR angiography or Doppler sonography.

Finally, the knowledge of a potential vertebral artery origin variant appears to be mandatory for planning vascular surgery and endovascular intervention and must be considered in patients in whom the normal position of the vertebral artery cannot be detected. Anomalous origin may theoretically lead to altered haemodynamics and predispose the patient to intracranial aneurysms formation. Therefore, in patients with vertebral artery anomalies, a thorough search for coexisting aneurysms should be undertaken.

REFERENCES


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