

Case Report

A Rare Case of Left Common Carotid Trifurcation Giving Origin to Vertebral Artery

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Abstract

Common Carotid Artery (CCA) anomaly is a relatively rarer entity in medical field. Rarely do we come across such cases but more commonly detected incidentally. Here we present a 55-year-old male patient presented with repeated brief episodes of stroke like features possibly Transient Ischemic Attack (TIA). He was taking medicines for hypertension; otherwise he didn't have any other medical comorbidities.

As a part of routine investigation and treatment conventional femoral carotid and cerebral angiography was done which detected 3 branches of left CCA (Trifurcation). They were External Carotid Artery (ECA), Internal Carotid Artery (ICA) and a Vertebral Artery (VA).

There was no other anomaly in the carotid and cerebral angiographic study. Computerized Tomography (CT) and Magnetic Resonance Imaging (MRI) were normal. Conservative management in the line of TIA was done. Patient got better, he is in regular follow up and there are no more TIAs again.

Keywords: Cardiovascular anomaly; Trifurcation of common carotid artery; Vertebral artery; Transient ischemic attack

Introduction

In a normal human being, Vertebral Artery (VA) arises from the subclavian arteries on both sides. Subclavian arteries arise from brachiocephalic artery on the right and from Arch of Aorta (AA) on the left side. However, there can be various congenital anomalies of AA and its branches [1]. Among them is anomalous origin of VA which is relatively rare and has been report to occur in 3% to 8% of cases [2]. Such cardio-cerebro-vascular anomaly is more commonly seen in different syndromes one of which is Klippel-Feil syndrome [3]. One of the anomalies of VA can be its location of origin other than its normal origin such as origin from direct AA, Common Carotid Artery (CCA) or its branches. Poonam et al. [4] found anomaly of VA origin in 4 out of 80 VAs in a cadaveric study which showed all the anomalies on the left side only. Out of 4, 3 originated from AA and one from External Carotid Artery (ECA). Most of the studies have shown that VA origin anomaly is seen more on left and more unilaterally.

Such abnormal origin of the VA or Carotid Artery (CA) may lead to various cerebral disorders because of alterations in cerebral hemodynamics and predispose the patients to stroke, intracranial aneurysm formation etc [5-7]. Shi-Min Yuan et al. [8] have also reported that Patients with aberrant origin of VA may remain asymptomatic and in about 5.5% of the cases symptoms were probably related to the aberrant origin of vertebral artery.

Though such cases of abnormal origin of VA have been reported earlier many times, this is still a rare and interesting entity in medical

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field. The main purpose of reporting this case is to share our experience of such rare entity.

Case Presentation

A 55-year-old male person came to routine outpatient clinic of neurology (second author) with the complaint of features suggestive of repeated Transient Ischemic Attack (TIA). He was admitted for the further evaluation and treatment. His Computerized Tomography (CT) and Magnetic Resonance Imaging (MRI) showed mild ischemic changes in brain. Other hematological investigations and cardiac evaluations including echocardiography were normal. He was further investigated with Carotid Doppler sonography on both sides of neck by the second author. Though that revealed normal findings on right side, there was confusing findings with multiple blood flow channels on the left side. For further evaluation, the case was referred to neurosurgeon (first author) for conventional angiography of carotid and cerebral circulation by femoral catheterization. Conventional angiography revealed normal VA, CCA and peripheral branches of ECA and ICA. However, on the left side, though the origin of left CCA was normal, there was no VA originating from AA or subclavian artery. Moreover, the left carotid bulb and its branching were abnormal. There were 3 terminal branches of left CCA namely ECA, ICA and VA (Figure 1). Injection of contrast in CCA demonstrated peripheral circulation of all the 3 branches. Selective injection on each of these 3 branches revealed selective peripheral branches of ECA, ICA and VA respectively (Figure 2). This confirmed the extra branch of left CCA was VA and nothing else.

Discussion

Congenital cardiac and AA anomaly is not uncommon. Lynn et al. [9] have shown abnormal origin of subclavian artery from congenitally abnormal hearts with abnormal AA. Trifurcation of CCA is one of the rarer findings which our case demonstrated.

Different authors have reported different types of trifurcation of CCA. Gurbuz J et al. [10] reported trifurcation of CCA into ECA, ICA and occipital artery. Another case report showed trifurcation of left CCA and the third branch was facial artery [11]. Chi-Jen C also

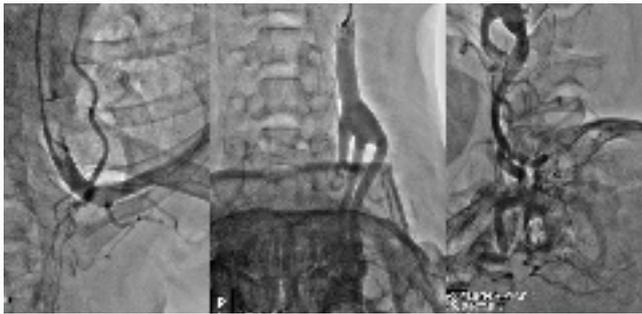


Figure 1: Conventional angiographic images showing, (A) Left Subclavian artery without origin of VA, (B) Trifurcation of left CCA bulb in AP view and (C) ECA, ICA and VA with peripheral branches in lateral view.

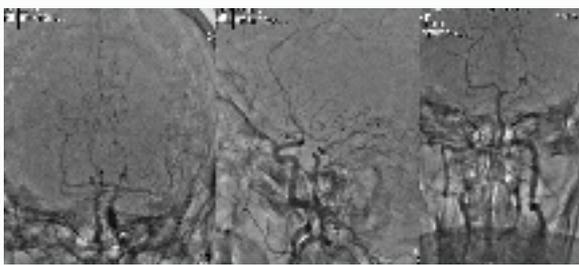


Figure 2: Conventional angiographic images showing, (A) basilar artery and its peripheral branches as well as branches of left ICA in AP view, (B) basilar artery and its peripheral branches as well as branches of left ICA in lateral view, (C) selective angiographic image of left VA and its peripheral branches including the contra lateral VA in AP view.

showed origin of VA from CCA but in his case it was on the right side in association with other anomaly of AA [12]. As has been mentioned earlier, Poonam et al. [4] also reported abnormal origin of VA from other parts of arch of aorta other than CCA.

Case reported by Onur et al. [3] is claimed to be rarer in which VA originated from right CCA. In our case it was on the left side and the third branch of CCA was VA without any other additional anomaly.

The case reported by Patil VP et al. [2] is much similar to ours as far as trifurcation of CCA and presenting symptoms are concerned. Both the cases had similar trifurcation, the third branch being VA, on the left side and presented with symptoms of ischemic stroke.

Search in Pub Med search with “Trifurcation of left common carotid artery” revealed hardly few cases similar to ours. Moreover there was only once case, by Patil VP et al. which completely matched with ours. This suggests extreme rarity of such anomaly.

Similarly while reviewing literature about abnormal origin of left VA, again hardly few cases appeared. Nurcan et al. [13] reported abnormal origin of VA from AA. Welch et al. [14] also reported similar type of abnormal VA origin directly from AA but in this case both the VA originated from AA. Similarly other reports have shown origin of VA from subclavian artery and distal AA [15].

Studies have also shown that such aberrant arteries lead to development of cerebral thromboembolic phenomenon and cerebral infarct. Shi-Min Yuan has clearly shown that aberrant origin of VA along with other factors has significant predictive value for the cerebral sequel [8]. This explains why our case also developed symptoms of TIA though there was no obvious angiographic anomaly leading to such symptoms. The case was managed conservatively in the line of ischemic stroke and got better.

In conclusion, such anomalies should be kept in mind while dealing with the cases with surgical or any other intervention. At times such anomaly can lead to different types of cerebral events and should be managed appropriately.

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