Current Research in MRI

Case Report

Vertebral Artery Fenestration: A Rare Vascular Variation Case Report

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Cite this article as: Aydemir H, Yesilyurt H, Koseturk T. Vertebral artery fenestration: A rare vascular variation case report. *Current Research in MRI*, 2024;3(2):65-67.

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Received: January 11, 2024 **Revision Requested:** January 29, 2024 **Last Revision Received:** January 29, 2024 **Accepted:** January 31, 2024
Publication Date: March 21, 2024

DOI:10.5152/CurrResMRI.2024.24090

Abstract

Vertebral artery fenestration (VAF) is a rare congenital vascular anomaly that is discovered by incidental during imaging studies of patients who do not exhibit associated symptoms or who have intracerebral hemorrhage as a result of concurrent artery aneurysm or arteriovenous malformations. During catheter angiography, VAF may be mistakenly identified as dissection, hypoplasia, or stenosis. This case report describes a left VAF that was incidentally discovered during magnetic resonance angiography (MRA) utilizing the time-of-flight method.

Keywords: Magnetic resonance angiography, Vertebral artery, Fenestration

INTRODUCTION

Vertebral artery fenestration (VAF) is an uncommon congenital vascular anomaly that can occur extracranially or intracranially. It is defined by a localized split of the vertebral artery (VA) into two parallel channels that subsequently reunite back to a single arterial lumen.[1] Based on autopsy and angiographic studies, the incidence of VAF is estimated to be between 0.23% and 1.95%.[2] It is critical to distinguish between the terms "duplication" and "fenestration," which are sometimes, though wrongly, used synonymously. A VA with 2 sources, a varied trajectory, and a variable level of fusion in the neck is referred to as duplication. In contrast, fenestration, sometimes known as "partial non-fusion," refers to a single-origin vein containing 2 parallel sections somewhere along its path.[3]

Computed tomography angiography probably has greater sensitivity for dissection diagnosis than MRA or ultrasound relative to conventional angiography.[4] Although VAF is not a diagnostic problem in and of itself, proper VAF diagnosis is critical for several reasons. On imaging, VAF may resemble vertebral artery dissection (VAD), a diagnosis linked with substantial morbidity and even fatality. Vertebral artery dissection imaging findings include vascular stenosis/occlusion, pseudoaneurysm, intimal flap, and double lumen; however, the presence of a double lumen has also been reported in VAF. Failure to distinguish between VAF and VAD may result in higher morbidity from unnecessary treatment, such as anticoagulation, follow-up imaging, and anxiety in patients with VAF who are incorrectly diagnosed with VAD.[1,5,6]

In this case report, we aimed to present a case of left VAF in a 22-year-old male patient, which was detected incidentally on magnetic resonance angiography (MRA) obtained using the time-of-flight technique.

CASE PRESENTATION

A 22-year-old male patient complaining of right-sided headache that had not responded to nonsteroidal anti-inflammatory drug treatment for 2 weeks was admitted to our hospital. The patient had no comorbidities, no history of trauma, and laboratory findings were normal. In the MRA examination performed using the time-of-flight technique to exclude possible intracranial vascular malformation, the left VA was divided into 2 parts in the V4 segment and was observed to be fenestrated at this level, rejoining just before forming the basilar artery (Figure 1).

Consent for publication: The patient signed the required consent documents.On the form, the signer granted permission for patient images and other clinical data to be published in the journal.The patient was aware that all efforts would be made to keep her identity a secret and that neither her name nor initials would be published.

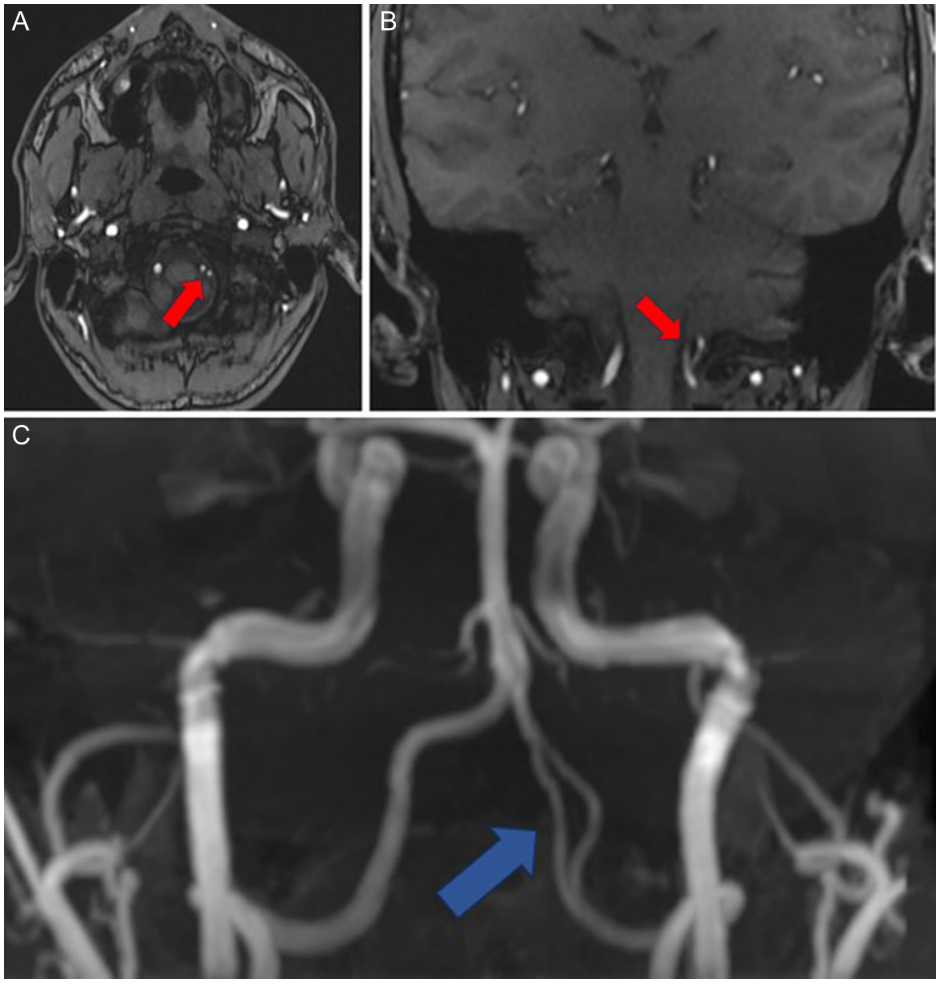

Figure 1. (A, B) In the axial and coronal MRA image, the left VA is divided into 2 parts (red arrows). (C) The maximum intensity projection image shows that the left VA was divided into 2 parts in the V4 segment and was observed to be fenestrated at this level, and rejoining just before forming the basilar artery (blue arrow).

DISCUSSION

The persistence of anastomotic vascular pathways in embryos results in fenestrations. The plexiform anastomoses between the cervical intersegmental arteries that emerge from the aorta give rise to the vertebral arteries during pregnancy.[2,7,8] Vertebral artery fenestration can be seen in the intracranial or extracranial segment of the VA. The extracranial region of the upper cervical level is where it is most prevalent,[9] but the VA's V1 segmental fenestration is incredibly uncommon; in 2013, Gard et al[10] described the first case worldwide.

The clinical significance in this case is the possibility that fenestration of the VA in segment V4 may be confused with VAD. On the other hand, dissections are acquired flaws in the vessel's intima that lead to intramural hematomas that might obstruct or narrow the damaged channel. Dissections may occur spontaneously, after trauma, in people with underlying connective tissue illnesses, or in cases when there are hereditary or environmental risk factors.[1] According to current guidelines, patients diagnosed with VAD should receive antithrombotic therapy, which includes anticoagulant or antiplatelet medications, for 3-6 months. Arterial dissections are usually monitored radiographically over time because they might proceed from focal artery narrowings to frank occlusions or the development of pseudoaneurysms and possible aneurysmal rupture.[11,12] The prognosis for VAD includes the possibility of major disabling deficits and even death in some patients. Incorrect diagnosis of VAD may lead to unnecessary treatment and follow-up imaging risks.[13]

D'Sa et al[1] determined that 9% of patients with intracranial and extracranial VAF had intracranial aneurysms in their study. This is higher than the reported incidence of unruptured intracranial aneurysm in the general population, which is 3.6%-6%.[14] Therefore, it is recommended that identification of VAF on imaging be given greater attention to aneurysms in the same patients.

Herein, the authors present a case of intradural left VAF found incidentally in a man who complained of headache. Fenestrations are an important anatomical variant to appreciate in order to prevent any iatrogenic injuries while caring for patients undergoing endovascular and invasive intracranial interventions. The significance of this case is that it increases our knowledge of uncommon anatomical variations of VA. In this instance, medical professionals can identify the lesions and provide the right treatment to prevent iatrogenic injury. Additionally, this case increases the differential diagnostic spectrum of VAD.

Ethics Committee Approval: N/A.

Informed Consent: Written informed consent was obtained from patients and their relatives who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – H.A., H.Y.; Design – H.A., T.K.; Supervision – H.Y., T.K.; Materials – H.A.; Data Collection and/or Processing – H.A., H.Y.; Analysis and/or Interpretation – H.Y.; Literature Review – H.A., T.K.; Writing – H.A.; Critical Review – H.A., T.K.

Declaration of Interests: The authors declare that they have no competing interests.

Funding: The authors declare that this study received no financial support.

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