

Vertebrobasilar Arterial Fenestration Detected by Magnetic Resonance Angiography: Pictorial Neurological Disease

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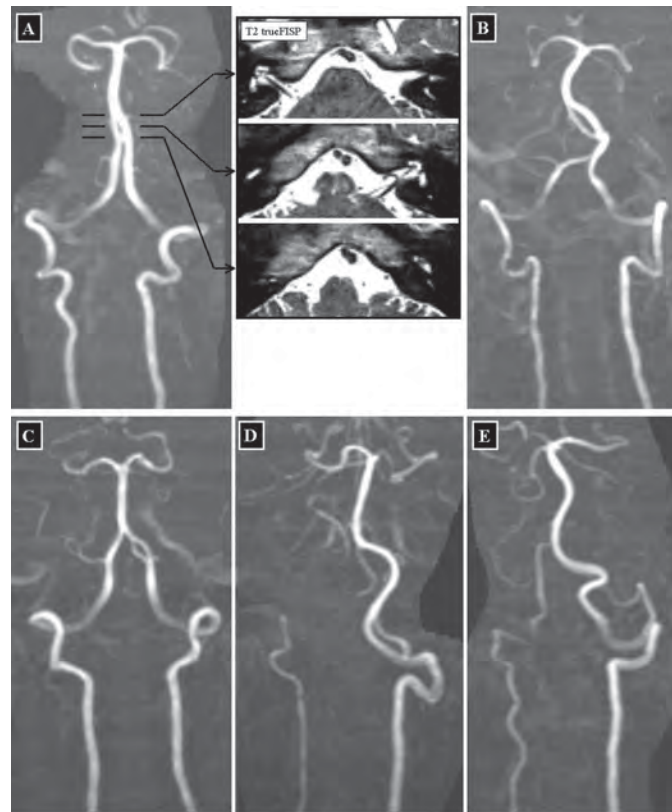


Figure 1. Three-dimensional time-of-flight magnetic resonance angiography in Case 1 (A), 2 (B), 3 (C), 4 (D) and 5 (E), and T2 true fast imaging in steady state precession (T2 trueFISP) in Case 1 (A).

The prevalence of fenestration was 0.3~0.6% for the basilar artery and 0.2~2.2% for the vertebral artery in the previous angiographic studies⁽¹⁻⁴⁾. However, cerebral digital subtraction angiography was invasive and presented with 0.4%

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of persistent neurologic complication⁽⁵⁾; consequently, time-of-flight magnetic resonance angiography (MRA) or computed tomographic angiography (CTA) is safer and less suffering for detecting intracranial vascular abnormalities. In the recent 2-year literature, the prevalence of fenestration via the CTA and MRA was 2.33 %⁽⁶⁾ and 1.5%⁽⁷⁾ respectively, and that via MRA was 0.9% for the vertebral artery, occurring more often on the left side⁽⁸⁾. Furthermore, the prevalence of fenestration is still inconclusive for the vertebrobasilar artery (VBA) in the Taiwanese population.

Between 2008 and 2010, 96 patients suffering dizziness, headache or tinnitus received MRA with T2 true fast imaging with steady state precession at the neuro-otological special clinic in a regional hospital located in North Taiwan. There were five patients who had a fenestration in the VBA, including Case 1 (56-year-old woman, Fig. A), Case 2 (72-year-old man, Fig. B), Case 3 (62-year-old woman, Fig. C), Case 4 (59-year-old woman, Fig. D) and Case 5 (79-year-old man, Fig. E). Case 1&2 had a fenestration in the proximal basilar arteries and Case 3~5 had it in the left vertebral arteries; besides, Case 4&5 had right hypoplastic vertebral arteries, contralateral to the fenestration-side. Clinically, Case 1, 2, 4 & 5 presented with episodic dizziness and Case 3 presented with right pulsatile tinnitus. All of them did not present with any neurologic focal symptom or sign so in the VBA insufficiency was not likely; besides, their brain magnetic resonance images were unremarkable; hence, it was unknown which etiologies contribute to their clinical symptoms. All of our five patients were treated conservatively with symptomatic control; however, an oral antiplatelet, aspirin 100 mg QD (Case 4), or with an oral circulatory promoter, piracetam 1200 mg BID (Case 1, 2 and 5) or a HMG-CoA reductase inhibitor, atorvastatin 10 mg QD (Case 3) were also prescribed. Then, the clinical symptoms remitted in one to three months, and the follow-ups were uneventful.

Duplication involves two vessels, which are originated from two different vessels and then fuse into the same vessel at a certain level⁽⁹⁻¹¹⁾; however, fenestration involves a short vascular segment, which contains an interrupted lumen and then reforms into the same single vessel. A tiny fenestration can also be called as an arterial slit, and may be overlooked or misinterpreted as focal arterial ectasia⁽¹²⁾, as in Case 1 (Fig. A); in addition, a long fenestration can also be called segmental duplication^(10,13), and may be misinterpreted as a tortuous anterior inferior cerebellar artery or posterior inferior cerebellar artery, as in Case 2 (Fig. B) and Case 5 (Fig. E).

The fenestration in the VBA could be attributable to abnormal degenerative development of the VBA in the 5th embryological week⁽¹¹⁾. Most intracranial vascular fenestrations were not symptomatic, but predisposed the sufferers to aneurysm^(10,13) and dissection because of vascular media defects⁽¹⁴⁾. The altered hemodynamic state was likely to cause local turbulence and retard the posterior circulation, possibly inducing episodic dizziness with exertion, fatigue or postural changes as in Case 1, 2, 4 and 5. In Case 3, CTA had not demonstrated any dural arteriovenous fistula, and MRA had demonstrated the calibers and flow signals of bilateral vertebral arteries were symmetric; therefore, the relationship of the left vertebral arterial fenestration (Fig. C) and her right pulsatile tinnitus was unclear.

Although surgical or angiographic obliteration of the redundant lumen would offer definitive treatment in selecting cases⁽¹⁵⁾, conservative treatment for clinical symptom was recommended. Although anticoagulative or antiplatelet treatment might prevent the thrombus formation in such patients⁽¹⁾, there is yet little evidence supporting the indication in the literature. Eventually, in this small MRA study, the prevalence of fenestration was 2.1% (2 of 96) for the basilar artery and 3.1% (3 of 96) for the vertebral artery, and the sum 5.2% (5 of 96) for the VBA in the patients who visited this neuro-otological special clinic. Although the fenestration in the VBA is an incidental finding of MRA or CTA studies, further studies are warranted to corroborate the curious neuro-radiological findings here and address potential neurological significance that is more applicable to the general Taiwanese population.

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