

## A rare cause of trigeminal neuralgia: Arteriovenous malformation in prepontine cistern

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A 36-year-old male patient had a complaint of severe pain in the form of an electric shock sensation, occurring on average 20 times a day for approximately one month, radiating from top to bottom in the maxillomandibular area on the left half of his face, and lasting for several seconds. The patient, who did not describe any accompanying autonomic findings, was started on carbamazepine 400 mg/day at an external center with the diagnosis of trigeminal neuralgia (TN). The patient, who stated that his complaints had partially improved, was admitted to our clinic for maintenance treatment planning. There was no known disease diagnosis or history of drug use in the patient's medical history. The neurological examination was normal. On brain magnetic resonance imaging (MRI) and brain magnetic resonance angiography, there was an appearance compatible with vascular malformation in the left prepontine cisterna (Figures 1-3). After the MRI, the patient underwent digital subtraction angiography (DSA) for more detailed vascular examination. In DSA images, consistent with MRI, an arteriovenous malformation (AVM) originating from the dilated pontine artery or arteries on the left, with a nidus of approximately 1.3 cm, and a large venous structure opening into the left transverse sinus were observed. The findings obtained in DSA imaging performed with contrast material injection from the left vertebral artery are presented in Figure 4. The arrow indicating the pontine artery originating from the basilar artery indicates the feeding artery of the AVM, the triangle shape the AVM nidus and the asterisk the dilated vein of the

AVM opening into the transverse sinus. During the patient's follow-up, the carbamazepine dose was increased to 800 mg/day. The patient's pain palliation was achieved with this dose.

Trigeminal neuralgia, classified among trigeminal autonomic cephalalgias, is a clinical picture characterized by recurrent pain paroxysms felt like electric shocks in the sensory distribution areas of the trigeminal nerve (V1, V2, V3), with



**Figure 1.** Time-of-flight DSA images of the patient diagnosed with TN. The arrow indicating the pontine artery originating from the basilar artery indicates the feeding artery of the AVM, and the triangle shape indicates the AVM nidus.

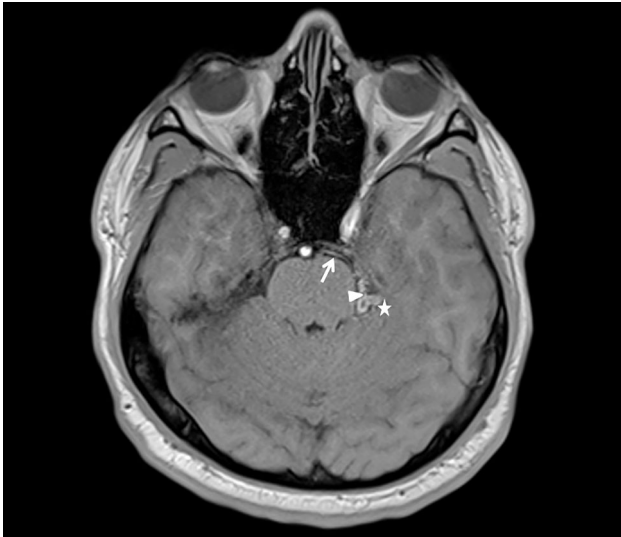
DSA: Digital subtraction angiography; TN: Trigeminal neuralgia; AVM: Arteriovenous malformation.

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**Figure 2.** T1-weighted MRI images of the patient diagnosed with TN. The arrow indicating the pontine artery originating from the basilar artery indicates the feeding artery of the AVM, the triangle shape indicates the AVM nidus, and the asterisk indicates the dilated vein of the AVM opening into the transverse sinus.

MRI: Magnetic resonance imaging; TN: Trigeminal neuralgia; AVM: Arteriovenous malformation.



**Figure 3.** T2-weighted MRI images of the patient diagnosed with TN. The arrow indicating the pontine artery arising from the basilar artery indicates the feeding artery of the AVM, the triangle shape indicates the AVM nidus, and the asterisk indicates the dilated vein of the AVM opening into the transverse sinus.

MRI: Magnetic resonance imaging; TN: Trigeminal neuralgia; AVM: Arteriovenous malformation.



**Figure 4.** Digital subtraction angiography images of a patient diagnosed with TN. In all figures, the arrow indicating the pontine artery originating from the basilar artery indicates the feeding artery of the AVM, the triangle indicates the AVM nidus, and the asterisk indicates the dilated vein of the AVM opening into the transverse sinus.

TN: Trigeminal neuralgia; AVM: Arteriovenous malformation.

sudden onset, short duration, and very severe intensity.<sup>[1]</sup> Trigeminal neuralgia, which mostly affects women over the age of 60, is divided into classic TN, secondary TN, and idiopathic TN in the third edition of the International Classification of Headache Disorders by the International Headache society.<sup>[2]</sup> Secondary TN describes TN-like pain that occurs due to a central nervous system pathology and are milder than the classic type. Demyelination of primary sensory trigeminal afferent fibers is the dominant mechanism in the etiopathogenesis of TN, which can be triggered by minimal stimuli, such as talking, chewing, brushing teeth, touching, and wind. This demyelination is often caused by compression of the nerve root by the superior cerebellar artery. Other controversial etiological causes include ephaptic transition, neurogenic vasodilation in the trigeminal ganglion, and the presence of an epileptogenic focus in the brainstem.<sup>[3]</sup> Vascular compression of the trigeminal nerve in the prepontine cistern is referred to as the peripheral theory and is the widely accepted etiological theory for TN. Primary neurovascular compression is the mechanical compression of the vascular structure on the trigeminal nerve without any underlying disease or vascular pathology. Since this compression can be observed in asymptomatic patients or on the asymptomatic sides of symptomatic patients, it

is not considered sufficient for diagnosis alone. Brain tumors such as meningioma and vestibular schwannoma, aneurysms, or, more rarely, AVMs can secondarily compress the trigeminal nerve and cause neurovascular compression.<sup>[4]</sup> Arteriovenous malformations are difficult to treat because they have a high risk of bleeding. While microsurgery can be applied in some cases, in recent years, the combination of endovascular embolization and stereotactic radiosurgery has been the most popular treatment option.<sup>[5]</sup> In the determination of these etiological factors, MRI and DSA are important radiological imaging techniques.<sup>[6]</sup> In the case we presented, the left trigeminal nerve underwent vascular compression due to the AVM detected in the prepontine cistern, which caused the TN. This case was presented to draw attention to the possibility of AVM in TN patients whose etiology cannot be identified due to common reasons.

**Data Sharing Statement:** The data that support the findings of this study are available from the corresponding author upon reasonable request.

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