

# Dural arteriovenous fistula and arteriovenous malformation presenting as trigeminal neuralgia

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## DESCRIPTION

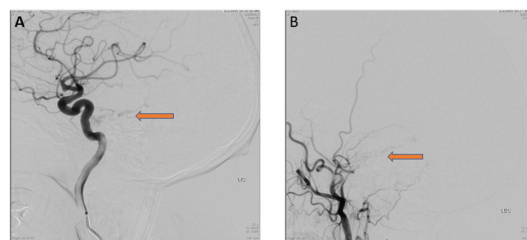
A 56-year-old man presented to our emergency department for intractable left facial pain. The pain originally started about 10 months prior and was described as intermittent, sharp and shock-like in the left mandible and jaw area, triggered by chewing or touching his face. He was initially seen at an outside institution about 3 months prior and diagnosed with trigeminal neuralgia (TN). He had been placed on carbamazepine and lamotrigine but had worsening pain despite increased doses. Physical examination was significant for pain triggered on palpation of the left V3 region.

MRI of the brain revealed abnormal vasculature at the level of the left Meckel's cave (figure 1). The patient was planned for a digital subtraction angiography (DSA) for further evaluation. Initial DSA revealed a left tentorial artery with a dense collection of abnormal small vessels in the region of the left Meckel's cave and early venous drainage to the left transverse–sigmoid junction as well as the Galenic system with no clear nidus (figure 2).

Embolisation was planned for the suspected dural arteriovenous fistula (dAVF) and a high-resolution CT/digital subtraction angiography (DSA) was performed for surgical planning. High-resolution CT/DSA revealed an anterior inferior cerebellar artery-fed arteriovenous malformation (AVM) with deep venous drainage into the Galenic system and left transverse sinus with the nidus in the left cerebellopontine angle cistern (figure 1). Embolisation was no longer pursued due to the proximity of the feeding artery to the basilar artery, small size of the feeding artery, the unruptured nature of the AVM and the perceived risk of embolisation and/or microsurgery. The patient instead underwent a gamma knife procedure where a regular radiation dose (20 Gy) was applied to the AVM nidus, and a



**Figure 1** (A) MRI of the brain showing tortuous vessels (orange arrow) in the left Meckel's cave. (B) Selective right vertebral artery angiography demonstrates a 7×6×7 mm nidus (orange arrow) of arteriovenous malformation fed primarily by the anterior inferior cerebellar artery on the left side.



**Figure 2** Selective left internal carotid artery and external carotid artery angiography demonstrating contribution from the left tentorial artery (A) and left middle meningeal artery (B) to the abnormal vasculature.

higher TN dose (85 Gy) was applied to the trigeminal nerve root entry zone, to achieve AVM obliteration and symptoms relief.

On follow-up at 1 year, the patient reported significant improvement with occasional mild left facial pain, which no longer interferes with his activities of daily living. Given that the duration of radiosurgery effect on AVM obliteration persists for up to 3 years, we usually follow asymptomatic patients with yearly MRI for surveillance of treated site. We repeat catheter angiogram at 3 years to evaluate for AVM obliteration.

TN is a rare condition with incidence varying from 12.6/100 000 person-years to 28.9/100 000 person-years.<sup>1</sup> Rarely AVMs and dAVFs have been described in the literature to be associated with TN.<sup>2,3</sup> Okromelidze *et al* reported a patient who had an 8-year history of lancinating intermittent right facial pain. Her symptoms were initially well controlled with carbamazepine until she had a dental procedure. Imaging revealed dilated vasculature in the right cerebellopontine angle. A diagnostic cerebral angiography confirmed the dAVF surrounding the right trigeminal nerve. She was treated with stereotactic radiosurgery and was symptom-free at 6-months follow-up.<sup>4</sup> Matsushige

## Learning points

- ▶ Although rare, trigeminal neuralgia (TN) can be caused by both arteriovenous malformation and dural arteriovenous fistulas.
- ▶ This case highlights the importance of pursuing comprehensive imaging for any possible structural causes of TN, and maintaining a high level of suspicion for abnormal MRI findings concordant with TN symptoms.
- ▶ Gamma knife surgery is a potential therapeutic option that can be used in these cases.



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*et al* presented a case with a 1-month history of facial pain in the right V1 and V2 divisions of the right trigeminal nerve. A dAVM in the petrotentorial region was found on the cerebral angiography, and his MRI revealed compression of the root entry zone by a dilated petrosal venous varix. He underwent gamma knife surgery. He was off medication at the 1-year follow-up visit and had no evidence of recurrence or adverse effects in the 3-year follow-up.<sup>5</sup> To our knowledge, these are the only two cases treated solely by gamma knife.

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