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Neuronavigation assisted decompression of trigeminal neuralgia caused by cerebellopontine angle osteoma☆

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ABSTRACT

Trigeminal neuralgia (TN) is usually caused by vascular compression of the trigeminal nerve root entry zone, but can be caused by other factors such as tumors, vascular disorders, and demyelination in multiple sclerosis. We present a rare case with a huge osteoma located on the cerebellopontine angle (CPA) and causing TN. A 48-year-old woman presented with TN caused by a huge left CPA bone tumor. Surgery was performed by the lateral suboccipital approach under neuronavigation system guidance and regional decompression of the trigeminal nerve root entry zone was achieved. Intraoperative, neuro-navigation system was very useful for identification of the trigeminal nerve entry zone because normal anatomy had been obscured by the huge osteoma. Her pain disappeared completely immediately after surgery. The histological diagnosis was osteoma. TN is an expectative symptom of CPA tumors. Osteomas should be considered in patients with CPA tumors.

Introduction

Trigeminal neuralgia (TN) is usually caused by vascular compression of the trigeminal nerve root entry zone, but can be caused by other factors such as tumors, vascular disorders, demyelination in multiple sclerosis. It is reported that 1–9.9% of cases with TN are due to cerebellopontine angle (CPA) tumors [1].

Osteomas in the CPA and petrous bone are very rare, and to our knowledge, only 20 cases have been reported in the literature [2].

We present a very rare case with a huge osteoma located on the inner surface of the left petrous bone and causing TN.

Case report

A 48-year-old woman was admitted to our department because of a 5-year history of left facial pain. She experienced a sharp pain in the left mandibular area. Carbamazepine and several courses of gasserian ganglion block produced temporary improvement. However, two months before admission, the pain then worsened and became refractory to medication.

Neurological examination showed no abnormalities and hearing sensation was intact.

Computed tomography (CT) showed a 50 × 15 mm bone density lesion on the inner surface of the left petrous bone partially involving the internal auditory canal (Fig. 1).

Magnetic resonance imaging (MRI) showed compression on the pons and the root entry zone of the left trigeminal nerve (Fig. 2a, b).

Left upper suboccipital craniectomy was performed with the patient in the lateral oblique position. The craniectomy was performed high enough and lateral enough in the posterior fossa to expose an adequate length of the transverse sinus and the superior part of the sigmoid sinus. The dura was opened in an inverted T shape, involving the transverse and sigmoid sinuses at the base. However, the approach to the trigeminal nerve root was difficult as there was an abnormal bony structure interfering with our surgical orientation. We employed the electromyographic monitoring of the facial nerve function throughout the operation. The tumor was projected from the petrous bone to the CPA cistern but was not covered by endocranium (Fig. 3). There were few adhesions between the bony tumor and the arachnoid overlying the cerebellum. Employing surgical navigation system (Stealth Station®S7®) facilitated identifying the optimal approach to the fifth nerve root (Fig. 5), allowing us to gradually drill into the

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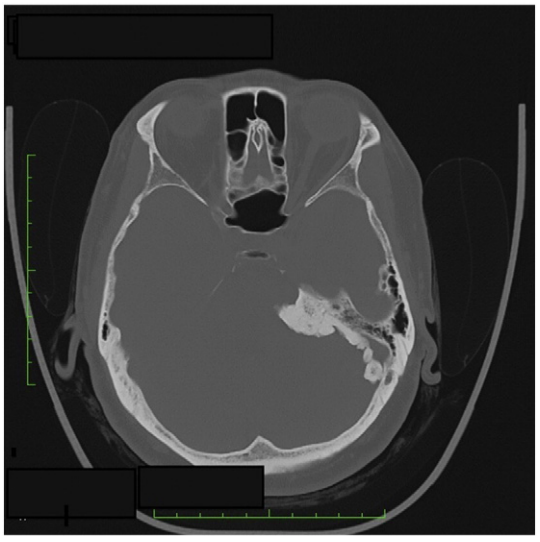

Fig. 1. Preoperative bone window computed tomographic scan demonstrating the left cerebellopontine angle lesion.

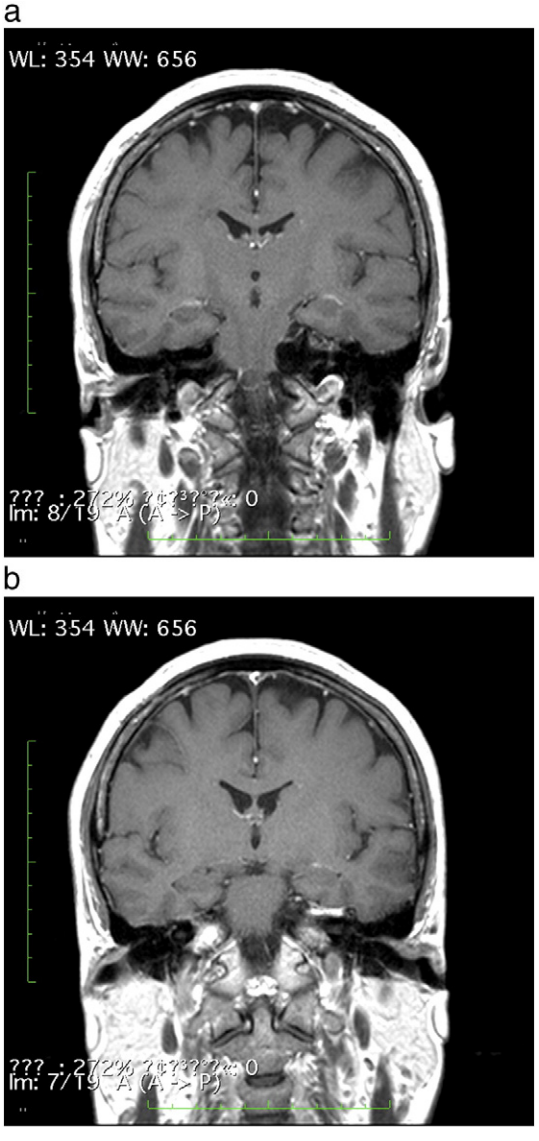

Fig. 2. Magnetic resonance imaging showed compression on the pons and the root entry zone of the left trigeminal nerve.

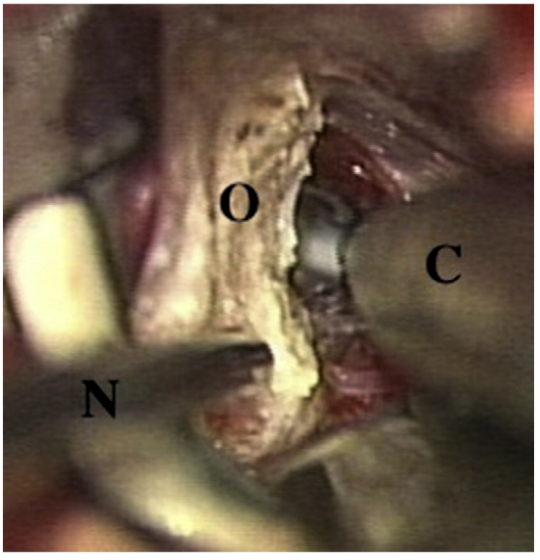

Fig. 3. Intraoperative view of the osteoma.

abnormal bony structure using a CUSA (SONOPET®, Stryker Japan®). We exchanged from the usual tips to the bone/hard tissue tips because the tumor was very hard. The petrous vein was identified and preserved during the drilling procedure. Ultimately, the fifth nerve was exposed (Fig. 4). The bony tumor around the fifth nerve root entry zone was meticulously removed to avoid damage to the nerve and the brainstem. At this point, we judged the purpose of the operation to have been achieved.

Pathologically, the mass lesion proved to be an osteoma. Her postoperative course was uneventful and her intractable pain disappeared completely immediately after surgery.

Her hearing and facial function was intact. She has not complained of recurrence of the pain for one year two months.

Discussion

It is very rare for TN to be caused by CPA osteoma. TN is usually caused by vascular compression of the trigeminal nerve root. However, 6–16% of such patients are reported to have various

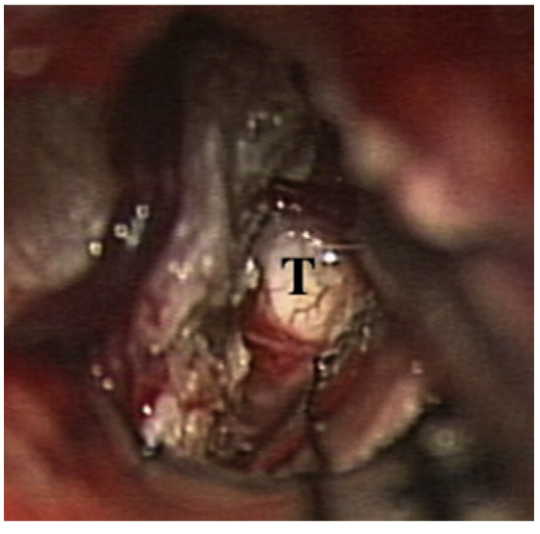

Fig. 4. Microsurgical view after tumor removal: trigeminal nerve was identified. O: osteoma, C: CUSA, N: neuro-navigation probe, T: trigeminal nerve.

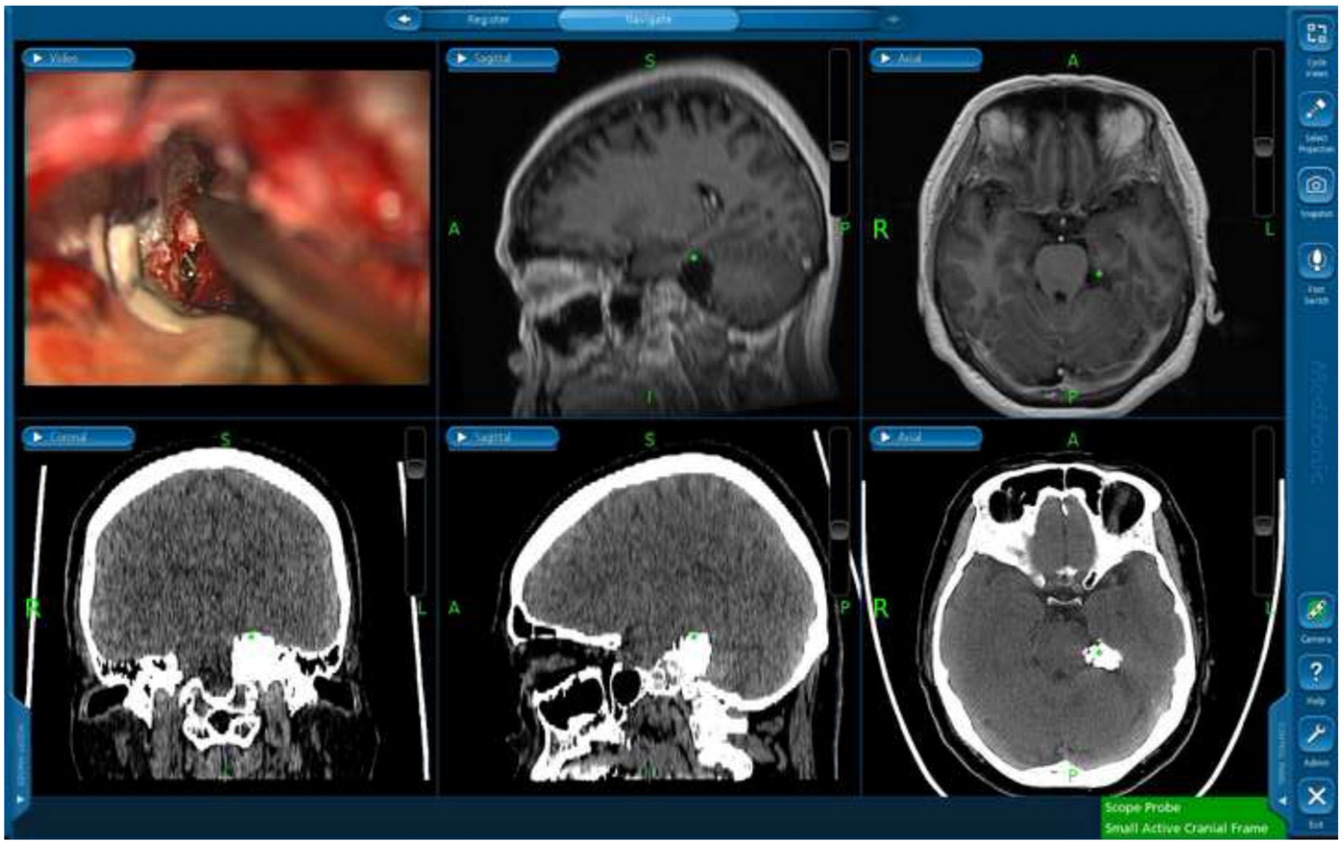

Fig. 5.

intracranial tumors, amyloid, small infarcts, aneurysms, arteriovenous malformation, venous angioma, fibrous ring or other lesions [3–5]. TN caused by a tumor might respond to medication with at least temporary symptom amelioration. Therefore, pain relief with agents such as carbamazepine does not exclude the presence of a tumor [1].

It is reported that 1–9.9% of TN cases are associated with CPA tumors, for example, epidermoids, meningiomas, vestibular schwannomas, temporal gliomas, and lipomas, but rarely with an osteoma [6,7]. Osteomas are benign neoplasms which grow slowly. Slowly growing tumors that expand rather than invade the trigeminal root are likely to cause trigeminal neuralgia [3]. CPA osteomas can manifest as trigeminal neuralgia, hearing loss, vertigo, and tinnitus or even cause brainstem damage [2].

MRI is a useful modality for ruling out arterial abnormalities, as well as tumors and demyelinating disorders. However, special caution is needed in searching for CPA, posterior fossa, supratentorial, and contralateral tumors. Treatment options for TN include medication, microvascular decompression (MVD), percutaneous rhizotomy, stereotactic radiosurgery (SRS), and peripheral nerve stimulation [8–10].

In our case, direct compression by the tumor was assumed to have caused TN. MRI showed direct compression on the root entry zone of the trigeminal nerve by the tumor, not apparent offending artery. The purpose of surgery in our case was not total removal of the huge osteoma, but rather to achieve pinpoint decompression of the trigeminal nerve root entry zone. We were able to achieve adequate and safe decompression by employing the neuro-navigation guidance system. Our search of the literature yielded previously reported case similar to ours [6,7]. As in our present case, a good outcome was achieved by surgical osteoma removal in the previous case.

Conclusion

We experienced a very rare case with a CPA osteoma caused TN. For adequate and safe decompression, we recognized the importance of early diagnosis by MRI and the usefulness of the neuro-navigation system for achieving regional decompression without damaging the trigeminal nerve. It is essential that TN is an expectative symptom of CPA tumors and osteomas should be considered in patients with CPA tumors.

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