Hemifacial Spasm Due to Cerebellopontine Angle Meningiomas
—Two Case Reports—

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Abstract
A 54-year-old female and a 49-year-old female presented with complaints of hemifacial spasm. Both patients underwent surgery to remove cerebellopontine angle meningiomas. In one case, no vascular compression was observed at the root exit zone. The tumor was removed subtotally leaving residual tumor adhered to the lower cranial nerves. The hemifacial spasm disappeared immediately after the operation. The residual tumor was treated using gamma knife radiosurgery. In the other case, the root exit zone of the facial nerve was compressed by both the tumor and anterior inferior cerebellar artery and the tumor was removed totally. Postoperatively, the hemifacial spasm disappeared, but the patient suffered facial nerve paresis and deafness that was probably due to intraoperative manipulation. However, the facial nerve paresis gradually improved. Cerebellopontine angle meningioma with hemifacial spasm must be treated by surgical resection limited to preserve cranial nerve function. Subtotal removal with subsequent radiosurgery to treat the remaining tumor tissue is one option for the treatment of cerebellopontine angle meningioma.

Key words: cerebellopontine angle, hemifacial spasm, meningioma

Introduction
Hemifacial spasm is usually caused by vascular compression at the root exit zone of the facial nerve. Hemifacial spasm resulting from a tumor is very rare. The incidence of tumor-related hemifacial spasm is 0.3% to 2.5% of all hemifacial spasms, and the incidence of meningioma among such tumors is very rare (0.08% to 1.3%). Here, we report two cases of cerebellopontine angle meningiomas with hemifacial spasm. One patient was treated by surgery and the other patient was treated by surgery combined with radiosurgery. We describe this rare condition and discuss the usefulness of surgery combined with radiosurgery for cerebellopontine angle meningioma to preserve cranial nerve function.

Case Reports
Case 1: A 54-year-old female was admitted to our hospital after suffering from hemifacial spasm on the left side for 3 years. Neurological examination found hemifacial spasm and slight facial nerve paresis on the left side with normal hearing. Magnetic resonance (MR) imaging revealed a left cerebellopontine angle tumor of 25 mm diameter (Fig. 1A).
Left lateral suboccipital craniotomy was performed with the patient in the supine position. The seventh and eighth cranial nerves were compressed and displaced upward by the tumor. The tumor was carefully removed with preservation of the arachnoid plane to avoid manipulation of the facial nerve. The tumor had not extended into the meatus of internal auditory canal. The tumor was removed subtotally. The remaining tumor tissue extended beneath the lower cranial nerves (Fig. 1B). No vascular compression was observed at the root exit zone of the facial nerve. The hemifacial spasm disappeared immediately after the surgery, and the preexisting facial nerve paresis was not observed at the follow-up examination. The residual tumor was treated by gamma knife radiosurgery at 2 months after the initial surgery with minimum tumor dose of 12 Gy. Follow-up MR imaging revealed a slight decrease in the size of the tumor.

Case 2: A 49-year-old female was admitted to our hospital after suffering hemifacial spasm for 4 years. Neurological examination found left hemifacial spasm with no other deficits. Hearing was also normal. MR imaging revealed a left cerebellopontine angle tumor of 20 mm diameter (Fig. 2A). Left lateral suboccipital craniotomy was performed, and the tumor was removed totally (Fig. 2B). The eighth cranial nerve was compressed markedly by the tumor. The tumor had not extended into the meatus of internal auditory canal. After the tumor was removed, the anterior inferior cerebellar artery was found to have compressed the root exit zone of the facial nerve. A small piece of nonabsorbable (Teflon) pad was introduced between the anterior inferior cerebellar artery and the root exit zone of the facial nerve. Postoperatively, hemifacial spasm disappeared, but seventh and eighth cranial nerve pareses were observed, probably due to intraoperative manipulation. However, the facial nerve paresis gradually improved by the follow-up examination.

Discussion

Hemifacial spasm resulting from tumors was reported in four of 1310 hemifacial spasm cases (0.3%), nine of 1676 cases (0.54%), and four of 158 cases (2.5%). The most common tumor causing hemifacial spasm is epidermoid tumor. The hemifacial spasm resulting from a cerebellopontine angle meningioma is very rare, occurring in only one of 1310 hemifacial spasm cases (0.08%) and two of 158 cases (1.3%).

Cases of hemifacial spasm resulting from cerebellopontine angle meningioma are characterized by two intraoperative findings: tumor compression of the root exit zone of the facial nerve, as in our Case 1; and tumor compression with vascular compression of the root exit zone of the facial nerve, as in our Case 2. Five cases of tumor compression without vascular contribution have been reported. One case of tumor compression with vascular compression of the root exit zone of the facial nerve was reported. The mechanism of hemifacial spasm is not fully understood. Two different mechanisms have been proposed, ephaptic pathophysiology of ectopic neural activity and hyperexcitability of the facial nucleus. Both ectopic generation of the neural impulse and ephaptic spread via an artificial paradoxical synapse occur in areas of focal demyelination. Ephaptic transmission may be a cause of the electrophysiological hallmark of hemifacial spasm. The actual site of the lesion was not localized. However, the lesion was most likely at the site of the root exit zone or at a nuclear level due to the hyperexcitability of the facial motor nucleus. In the case of cerebellopontine angle meningiomas, the tumor may compress or distort either the root exit zone of the facial nerve or the facial nucleus, resulting in hemifacial spasm. Vascular compression was one cause of hemifacial spasm due to the cerebellopontine angle meningioma in a previous case and our Case 2.

Treatment of cerebellopontine angle meningioma with hemifacial spasm is intended to decompress the root exit zone of the facial nerve, to remove the tumor, and to preserve the cranial nerve function. In the case of epidermoid tumor, removal of the tumor around the cranial nerves is relatively easy, but in the case of meningioma, tumor adhering to the...
cranial nerves is sometimes difficult to remove. Excellent surgical results were obtained in the treatment of meningioma affecting the cerebellopontine angle, and the tumor was removed completely in 95% of 134 cases.7) However, facial nerve paresis occurred in 17% of patients (11% had preexisting facial nerve paresis). Excellent surgical results have been reported in the treatment of cerebellopontine angle meningiomas. Only one of 64 patients (1.6%) suffered new facial nerve paresis postoperatively.14) One patient suffered new lower cranial nerve paresis after surgery due to the manipulation of the lower cranial nerves.8) In our Case 1, the tumor tissue near the lower cranial nerves was undisturbed, and subsequently treated by radiosurgery. Subtotal resection and fractionated radiation therapy can preserve the vascular and central nervous structures in some cases of cerebellopontine angle meningiomas.11) We have also obtained excellent results in the use of radiosurgery for the skull base meningiomas.5) The tumor tissue surrounding and adhering to the cranial nerves may be left for radiosurgery to preserve cranial nerve function in the case of cerebellopontine angle meningioma.

We conclude that cerebellopontine angle meningioma with hemifacial spasm must be treated by surgical resection limited to preserve cranial nerve function. Subtotal removal with subsequent radiosurgery to treat the remaining tumor tissue is one option for the treatment of cerebellopontine angle meningioma.

References

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