Surgical Management of Trigeminal Schwannoma

Caetano Coimbra, MD; Kyle Doughty, MD; Manu Gupta, MD; Amol Bhatki, MD; Yoav Hahn, MD

Trigeminal schwannoma (TS) are rare benign nerve sheath these tumors arising along the course of the trigeminal nerve (TN). The tumor can be confined to the cerebellopontine angle (CPA) within the posterior cranial fossa (PCF), the Meckel’s cave area within the middle cranial fossa (MCF), and occasionally involve the PCF and the MCF in a dumbbell configuration.

TS represents 0.1-0.4% of all intracranial tumors and 5% of all intracranial schwannomas. Its clinical presentation varies according to the location and size of the tumor and can include dysesthesia or hypoesthesia of the face, double vision, headache, retro-orbital pain, and balance/gait difficulties. Surgical treatment of TS can be challenging due to both tumor size and deep location. These sheath tumors are in dangerous proximity to the brainstem, cavernous sinus, internal carotid artery, basilar artery, and cranial nerves.

Preservation of facial sensation and corneal sensation can be particularly difficult in large tumors. Loss of corneal sensation can lead to corneal ulcer and loss of vision. In this publication, two cases of trigeminal schwannoma in young patients are presented. The use of a focused transpetrosal approach refined at the Baylor Neuroscience Skull Base Center has allowed direct access to these rare tumors without manipulation of the temporal lobe or cerebellum.

CASE STUDY
Case #1: A 25-year-old presented with headache, loss of sensation involving all three divisions of the left TN, loss of corneal reflex, and wasting of the temporalis muscle. MRI demonstrated a large enhancing cystic tumor involving the PCF and the MCF with compression of the brainstem, the left temporal lobe and the cavernous sinus.

The tumor was approached using a small S shape incision around the ear. A combined middle fossa and transpetrosal/petrosal approach was used. The anterior and posterior petrous bone and the superior and posterior semicircular canals were removed to provide direct extradural, pre-sigmoid access to the CPA in the petroclival area. The dura of the temporal lobe was elevated from the tumor in the MCF providing extradural exposure of this part of the tumor.

The dural layers of the tentorium were split to provide extradural access to the superior CPA without any direct manipulation or exposure of the temporal lobe. Through this approach, direct access was gained to the entirety of the tumor from the brainstem posteriorly to the foramen ovale and rotundum anteriorly. The tumor was dissected away from the cavernous sinus and petrous ICA in the MCF and away from the brainstem, basilar artery and its branches, and CNs IV, VI, VII and VIII in the CPA.

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There was gross total resection of the tumor. Post operatively, the patient did well without speech, cognitive or motor difficulties. There was no cranial nerve dysfunction except for the pre-op TN palsy. Hearing was preserved despite resection of the two semicircular canals.

**Case #2:** A 20-year-old presented with occipital headache, balance and gait difficulty, and decreased sensation in the left perioral area. MRI demonstrated a large posterior fossa enhancing tumor with a cystic component occupying the left superior CPA with mass effect on the brainstem and fourth ventricle.

The tumor was approached using a focused anterior and posterior transpetrosal approach with removal of the superior semicircular canal. Dural layers of the tentorium were split allowing extradural access to the CPA and the tentorium incisura without exposure or direct trauma to the left temporal lobe.

The tumor was initially debulked and dissected away from the brainstem, basilar artery and its branches, and the CNs V, VI, VII and VIII. Particular attention was paid to preserve normal fibers of the TN. The normal fibers of the nerve were encountered at their entry into Meckel’s cave and followed posteriorly towards the brainstem in the medial aspect of the tumor. Post operatively, the patient had a transient partial CN VI palsy with double vision. Hearing was preserved. Sensation at the V1 division of the TN was also preserved with normal corneal reflex. At one year post-operative, the MRI shows no residual tumor and no abnormal signal in the cerebellum or the temporal lobe. The patient has no neurological deficits except for decreased sensation at the V2 and V3 divisions of the left TN and has resumed all of her pre-op activities.

In summary, TS are rare, challenging benign skull base tumors involving multiple compartments of the skull base. At the Skull Base Center, a customized approach is selected to address the anatomical details of each particular patient, providing the best chance to maximize function preservation and durable, favorable outcomes. Successful surgical management of these tumors requires a multidisciplinary team approach with close collaboration between Neurosurgery, Neuro-Otology and Neuroradiology. Innovative surgical expertise and personal experience in complex skull base surgery is necessary to maximize the potential for good outcomes and expeditious patient recovery while avoiding the numerous, potentially catastrophic complications inherent to these tumors.