En bloc petrosectomy using a Gigli saw for petroclival lesions

Technical note

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The authors report a new technique for en bloc petrosectomy using a Gigli saw as an alternative to drilling the petrous bone in the combined supra- and infratentorial approach or the transpetrosal–transtentorial approach. It is simple and easy and avoids postoperative cosmetic deformity. This technique has been performed in 11 petroclival lesions without injuring the semicircular canals, the cochlea, or the facial nerve.

Key Words • petroclival tumor • petrosectomy • retrolabyrinthine approach • transpetrosal–transtentorial approach • surgical approach

Operative Techniques

A supratentorial–infratentorial craniotomy across the transverse sinus is performed with the patient in the lateral position and the head flexed moderately. A small amount of the remaining mastoid bone overlaying the sigmoid sinus is rongeured to expose the edge of the posterior or rim of the sigmoid sinus. The full length of the sigmoid sinus down to the jugular bulb is meticulously dissected free from the overlying bone; afterward, presigmoid posterior fossa dura is separated from the posterior surface of the petrous bone. As the presigmoid dura is fixed to the posterior surface of the petrous bone at the entrance point of endolymphatic sac, this attachment is freed from the bone and the dura is further separated downward. After these procedures, the middle fossa dura and the superior petrosal sinus are separated from the petrous bone down to the level of the arcuate eminence. A nick for the Gigli saw is then made on the petrous ridge just behind the arcuate eminence with an oscillating saw or a high-speed air drill. By hanging the Gigli saw on this groove, petrosectomy is begun toward the imaginary line 5 mm superior to the upper margin of the internal auditory canal (Fig. 1). This osteotomy technique is performed principally when lines of osteotomy on the anterior and posterior petrous walls are to be the same. According to the location of the lesion, however, the more distal portion of the anterior or posterior wall is included in several cases. With this procedure, petrosectomy can be performed without injuring the cochlea, the semicircular canals, or the facial nerve (Fig. 2). This petrosectomy using a Gigli saw provides wide exposure of the petroclival region (Fig. 3). If greater exposure is required, however, the remaining petrous apex must be carefully drilled off.

To avoid postoperative cosmetic deformity, both the temporosuboccipital bone flap and the resected petrous bone are replaced on closure.

Discussion

During the past 3 years, this technique has been used in 11 cases of petroclival lesions including meningiomas, neurinomas, and giant aneurysms. Compared to our previous cases, the time taken to perform petrosectomy was dramatically shortened. Whereas the drilling of the petrous bone takes over 1 hour, even by a neurootologist, petrosectomy using a Gigli saw can be completed within a few minutes.
A large dead space is a consequent disadvantage in drilling off the petrous bone. This large dead space must be packed with a large volume of a fat or a muscle graft. With our technique, however, a large dead space is less likely to occur because the resected petrous bone is replaced and fixed. In fact, a large volume of a fat or a muscle graft was unnecessary in many of these cases. Furthermore, the replacement of the resected petrous bone avoided a postoperative cosmetic deformity in the retro-auricular area. Although Couldwell and Fukushima have reported a cosmetic mastoidectomy with the outer table of the mastoid bone, the dead space is still unavoidable beneath the replaced outer table of the mastoid bone and must be packed with a large volume of fat graft.

The drilling of the petrous bone and the mastoid process may injury the semicircular canals, the cochlea, or the facial nerve. Considering the anatomical location of the semicircular canals, the cochlea, and the facial canal, Figs. 2 and 3 illustrate that petrosectomy behind the arcuate eminence up to the upper margin of the external auditory canal does not carry a risk of injuring those structures. In our 11 cases, no injury of those structures occurred.

Spetzler, et al., have divided the combined supra- and infratentorial approach into three variations. Although our technique is basically applicable to their Type 1 approach, it is also possible to perform their Type 2 and 3 approaches by drilling off the remaining petrous bone and mastoid process following the petrosectomy with a Gigli saw.

Based on our experience, we conclude that this technique is safe, simple, and avoids postoperative cosmetic deformity.

References


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