

A Review on the Surgical Indications for Petrosal **Fissure Splitting**



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Introduction

Lesions of the lateral pons and the middle cerebellar peduncle represent a surgical challenge due to the presence of diverse neurovascular structures at risk of injury. The traditional retrosigmoid approach requires significant cerebellar retraction when accessing these regions. Splitting of the petrosal fissure, also referred to as the horizontal fissure, through extended retrosigmoid approaches, provides an enhanced direct surgical corridor to these lesions with minimal cerebellar retraction and potentially less risk of injury.







In this review, we aimed to synthesize the literature on post-operative outcomes after transpetrosal-fissure approaches for the treatment of diverse lesions of the lateral pons and cerebello-pontine angle.

Methods

We performed a systematic literature review according to PRISMA 2020 guidelines and included studies describing the splitting of the petrosal fissure to access the lateral pons, the REZ of the trigeminal nerve, or the middle cerebellar peduncle. Inclusion criteria included sufficiently descriptive post operative neurological outcomes.

Results

Forty-one patients from 11 studies published in the USA and Japan were included in this review. The mean age was 53 years old and 63% of patients were female.

The most prevalent pathology were cavernomas of the pons (44%), followed by metastasis (5%), cerebellar hematoma evacuation (5%), Teflon granulomas (5%) and arteriovenous malformation of the pons (2%). Microvascular decompression (MVD) for trigeminal neuralgia made up 39% of cases. Maximal lesion diameter was reported for 14

Figure 1. Distribution of pathologies among 41 cases utilizing the transpetrosal fissure approach.



Figure 2. Left: Intraoperative image of microsurgical dissection of the petrosal fissure to reach the middle cerebellar peduncle. Right: Illustration of splitting of the petrosal fissure.



(34%) of cases, all cavernomas, which had a mean size of 18 mm.

All forty-one cases utilized dissection of the petrosal fissure through variations of retrosigmoid approaches to gain access to the lateral pontine surface. Complications were reported in 10 (24%) of patients, 7 in patients undergoing microsurgical resection of cavernomas of the pons, and 2 in patients with Teflon granuloma, and 1 in a patient undergoing MVD. Among the 7 patients with cavernomas, 6 experienced transient worsening of hemiparesis or cranial nerve palsy, while the remaining one experienced transient mild cerebellar ataxia and permanent progression of an existing cranial nerve palsy. Remaining complications included transient hearing loss in the patient undergoing MVD and transient worsened cranial nerve palsy in those patients with Teflon granuloma.

Overall, 90% of complications were reported to be transient, resolving completely within one year.

No mortality was reported in any approach.

Figure 3: Left: Intraoperative image of opening of the middle cerebellar peduncle with sharp dissection along the expanded visual corridor gained by petrosal fissure splitting. Right: Illustration of opening of the middle cerebellar peduncle.



Figure 4: Left: Visualization of the middle cerebellar peduncle prior to splitting of the petrosal fissure. Right: Expanded visualization of the middle cerebellar peduncle gained through dissection of the petrosal fissure.

All surgical images published with patient consent.

Conclusions

Splitting of the petrosal fissure through the modified retrosigmoid approaches represents a relatively safe alternative for the resection of lesions in the middle cerebellar peduncle, lateral pons, and cerebellar hemispheres. The goal of surgery as determined by gross total resection or microvascular decom-

pression was achieved in nearly all cases with no reported mortality. Complications were not uncommon, however were transient in most of the patients.

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