

Important Notes in Surgical Anatomy of the Transpetrosal Approaches

Behzad Saberi*

Medical Research, Iran

***Corresponding Author:** Behzad Saberi, Medical Research, Iran.

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Abstract

The middle fossa transpetrosal approach was originally developed by King in 1970 and so-called “extended middle fossa approach” which was combined with middle fossa craniotomy and translabyrinthine approach. The method was mainly applied to acoustic tumors but it was indicated to clival lesions by Hakuba., et al. Although by employing this approach the risk of cerebellar damage will be lower but sacrifice of hearing and possible venous thrombosis of vein of Labbe and sigmoid sinus, are two major disadvantages of this approach.

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Al-Mefty [1] used the Posterior approach to the petroclival meningiomas by preservation of acoustic structures and Kawase [2-4] used the anterior transpetrosal approach for basilar trunk aneurysms and petroclival meningiomas by selected resection of petrous apex. The clival lesions were accessed by the shortest way to the area anterior to the internal auditory meatus without hearing ability loss. In brief, the anterior transpetrosal approach can be used for petroclival or prepontine lesions, petroclival tumors that showing extension into the middle fossa and meckel's cave such as trigeminal neurinomas or petroclival meningiomas showing middle fossa extension, prepontine epidermoids over the midline or with supratentorial extension and basilar trunk aneurysms or low positioned basilar top aneurysms to be clipped. The posterior transpetrosal approach can be used for large cerebellopontine angle tumors and by combination with the anterior transpetrosal approach it can be employed for large petroclival meningiomas extending posterior to the internal auditory meatus. As knowing the precise anatomy of the area and related surgical methods, make the foundation of getting good surgical results with fewer complications, the surgeon should be familiar with them [5-7]. The aim of this study is to point to some important anatomical aspects of transpetrosal approaches. This study has been done by reviewing various resources in the literature about surgical anatomy of transpetrosal approaches.

There are some important anatomical and surgical notes regarding petrosal approaches which should be kept in mind to avoid some postsurgical complications:

1. As mentioned earlier, combination of Anterior and Posterior Transpetrosal approaches is indicated for large petroclival meningiomas extending posterior to the internal auditory meatus.
2. Compared to the Lateral suboccipital approach,

The advantages are as follows

- a) No retraction damage to the cerebellum and cranial nerves (VII, VIII, IX, X and XI).
- b) Easy access to the tumor extended into the middle fossa and Meckel cave.
- c) Dried surgical field during tumor removal by devascularization of tumor feeders of middle meningeal and tentorial arteries.
- d) No surgical blindness to anterior brainstem and basilar artery.

The disadvantage is

a) A surgical limitation to the lower clivus and jugular area.

3. Compared to the subtemporal-transtentorial approach,

The advantages are as follows:

a) Lower risk of injury to the temporal bridging veins by the epidural access

b) Deeper observation below the trigeminal nerve

The disadvantage is

a) Longer operation time for resection of the pyramid.

4. In Anterior Approach, the surgeon should take enough care not to break dural bulging of the internal auditory meatus which is located at the postero-inferior margin of the triangle and not to resect the bone above the geniculate ganglion of the facial nerve, located superficially on an extension line of the Greater superficial petrosal nerve to avoid causing injury to the facial nerve. Overdrilling towards clivus may cause the abducens nerve to be injured in Dorello's canal.
5. In Anterior Approach, during tentorium incision, the incision is extended until cutting the tentorium completely. The surgeon should take care not to injure the trochlear nerve at the tentorial notch.
6. In Anterior Approach, during opening the Meckel's cave and detachment of feeders from the orifice of the Meckel's cave, The surgeon should be aware of the fact that the main tumor feeders originated from the tentorial artery, are commonly located medial to the orifice of the Meckel's cave.
7. As the Closure of the dura isn't possible, CSF leakage is prevented by a piece of abdominal fat which is transplanted on the exposed air cells of the pyramid and would be fixed with fibrin glue. The fat is wrapped with a pedicled temporalis fascia and the fascia is sutured with dura mater.
8. During Petrosectomy in Posterior Approach, The surgeon should be aware of the fact that Location of the Internal Auditory Meatus is suspected medial to the anterior semicircular canal. It is safer to open the posterior wall and superior wall secondly to prevent injury to the facial nerve. Also, the surgeon should Never open the funds of Internal Auditory Meatus because the facial nerve courses superficially at this point.
9. It would be important to know the Anatomical borders of Kawase Triangle which are:
 - a) Laterally, the GSPN,
 - b) Medially, the Petrous ridge,
 - c) Basically, the Arcuate eminence.

Conclusion

In conclusion, Anterior and Posterior transpetrosal approaches consist of important and specific methods which together make these approaches very helpful to approach certain pathologies. Knowing the precise anatomical aspects of such approaches and paying enough attention to the aforementioned anatomical and surgical notes, are of great importance for the surgeons to make their approaches more precise and with fewer complications.

Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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