Occipital transtentorial approach

Also known as Poppen approach after James Leonard Poppen

Poppen described the occipital transtentorial approach to the pineal region, this operative technique to access a deep-seated area was novel and effective, and now bears his name.

Occipital transtentorial approach provides a wider corridor for surgical manipulation compared with the supracerebellar transtentorial approach in most parts of the medial temporal region (MTR) 1).

The occipital transtentorial approach (OT) provides excellent exposure for lesions of the precentral cerebellar fissure, posterior incisural space, and adjacent structures. The lateral OT approach directed under the occipitotemporal junction provides an inline view for lesions situated posterolateral to the brainstem. It also provides an inferiorly directed view under the venous system into the precentral cerebellar fissure and fourth ventricular roof. Visual field deficits are minimized by directing the trajectory under the occipitotemporal junction instead of retracting along the interhemispheric corridor. The interhemispheric OT approach was primarily used for lesions extending superiorly, in the midline or near midline, above the tentorium and venous system into the splenium of corpus callosum, lateral ventricle, and posterior thalamus, where extensive lateral retraction was not required 2).

Indications

The occipital transtentorial approach is indicated for most pineal region tumors, but surgeon's preference and experience should also be considered. New understanding of the arachnoid membranes of this region may be helpful for tumor resection 3).

The occipital interhemispheric transtentorial approach OITT is a valuable approach for specific superior vermian, superomedian cerebellar, and tectal AVMs. Detailed assessment of angiographic features may however preclude its safety as a unique treatment plan, and complementary or alternative therapeutic options should be considered 4).

Case series

In 27 consecutive patients who underwent tumor resection through the Poppen approach for tentorial meningioma or pineal region meningiomas, the following morphologic parameters were assessed on a preoperative MRI: 1) tentorial angle; 2) tentorial length; 3) the shortest distance from the confluence of sinus to the tumor. All these parameters, together with tumor size, texture, and resection extent, were correlated with occipital lobe damage by using the ANOVA test, chi-square test, or Fisher's exact test.

The mean value was 55.3±5.6° (range 45-66°) for the tentorial angle, which was significantly associated with the occipital lobe damage grades (p=0.008), but this was not the case for the tentorial length (p=0.802) and the shortest distance from the confluence of sinus to the tumor (p=0.695). Interestingly, age was also strongly associated with occipital lobe damage risk (p=0.020). The patients in the subgroup with no occipital damage (Grade 4) were the youngest (aged 47.3 years), compared with other grades, with age of 58.0 years for Grade 1, 54.3 years for Grade 2, and 58.6 years for Grade 3. These two parameters were also significant after multivariate analysis. No correlation was observed between either tumor nature or the extent of resection and damage grades.

The risk of occipital lobe damage increases in the presence of a steep tentorial angle during the
Poppen approach for tentorial or pineal area tumors. Awareness of such anatomical features preoperatively is important for minimizing operative complications 5).

Videos

Case reports

Uchino et al. reported the case of a 73-year-old man with a hemorrhagic superior vermian arteriovenous malformation that was treated with surgical resection through the occipital transtentorial approach (OTA). This approach, with a direct perpendicular view of the whole lesion, enabled them to control the feeding arteries safely and to finally accomplish a total resection.

The OTA is an elegant approach for the resection of superior vermian AVMs. A detailed assessment of angiographic features is mandatory in selecting an effective and safe surgical approach for posterior fossa AVMs depending on their location.


