Transorbital endoscopic approach for posterior fossa exposure

Skull base lesions within the middle cranial fossa (MCF) remain challenging. Reports suggests that transorbital endoscopic approaches (TOEAs) might be particularly suitable to access the middle cranial fossa (MCF) and expose the lateral wall of the cavernous sinus and the Meckel's cave.

García-Pérez et al. developed a study to compare the nuances of the subtemporal approach (STA) with those of the lateral TOEA (LTOEA) to the MCF and posterior cranial fossa (PCF) in cadaveric specimens. After orbital craniectomy, interdural opening of the cavernous sinus lateral wall (CSlw), exposure of the Gasserian ganglion, and extradural elevation of the temporal lobe were performed. Next, an anterior endoscopic petrosectomy was performed and the PCF was accessed. They quantitatively analyzed and compared the angles of attack and distances between LTOEA and STA to different structures at the CSlw, petrous apex (PA), and PCF.

Cadaveric dissection through the LTOEA completely exposed the CSlw and PA. LTOA exhibited larger distances than the STA to all targets. Importantly, these differences were greater at the PA and its surrounding key anatomic landmarks. The horizontal and vertical angles of attack allowed by the LTOA were smaller both for the CSlw and PA. However, these differences were not significant for the vertical angle of attack at the CSlw.

LTOEA provides a direct ventral route to the medial aspect of MCF, PA, and PCF. Although TOEAs are versatile approaches, the unfamiliar surgical anatomy, and limited instrument maneuverability demand extensive cadaveric dissection before moving to the clinical setting [1)].

A study of Noiphithak et al. from the Division of Neurosurgery, Faculty of Medicine, Thammasat University, Pathumthani, Thailand and Departments of Neurosurgery and Otolaryngology-Head and Neck Surgery of The Ohio State University Wexner Medical Center, Columbus, proposes a variation of the transorbital endoscopic approach (TOEA) that uses the Orbital lateral wall as the primary surgical corridor, in a minimally invasive fashion, for the posterior fossa (PF) access. The versatility of this technique was quantitatively analyzed in comparison with the anterior transpetrosal approach (ATPA), which is commonly used for managing lesions in the PF.

Anatomical dissections were carried out in 5 latex-injected human cadaveric heads (10 sides). During dissection, the PF was first accessed by TOEAs through the anterior petrosectomy, both with and without lateral orbital rim osteotomies (herein referred as the lateral transorbital approach [LTOA] and the lateral orbital wall approach [LOWA], respectively). ATPAs were performed following the orbital approaches. The stereotactic measurements of the area of exposure, surgical freedom, and angles of attack to 5 anatomical targets were obtained for statistical comparison by the neuronavigator. RESULTS The LTOA provided the smallest area of exposure (1.51 ± 0.5 cm2, p = 0.07), while areas of exposure were similar between LOWA and ATPA (1.99 ± 0.7 cm2 and 2.01 ± 1.0 cm2, respectively; p = 0.99). ATPA had the largest surgical freedom, whereas that of LTOA was the most restricted. Similarly, for all targets, the vertical and horizontal angles of attack achieved with ATPA were significantly broader than those achieved with LTOA. However, in LOWA, the removal of the lateral orbital rim allowed a broader range of movement in the horizontal plane, thus granting a similar horizontal angle for 3 of the 5 targets in comparison with ATPA. CONCLUSIONS The TOEAs using the lateral orbital corridor for PF access are feasible techniques that may provide a comparable surgical

exposure to the ATPA. Furthermore, the removal of the orbital rim showed an additional benefit in an enhancement of the surgical maneuverability in the PF [2)].

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García-Pérez D, Abarca J, González-López P, Nieto J, Lagares A, Paredes I. A Frontal Route to Middle and Posterior Cranial Fossa: Quantitative Study for the Lateral Transorbital Endoscopic Approach and Comparison with the Subtemporal Approach. World Neurosurg. 2022 Aug 6:S1878-8750(22)01086-5. doi: 10.1016/j.wneu.2022.07.129. Epub ahead of print. PMID: 35944860.

2)

Noiphithak R, Yanez-Siller JC, Revuelta Barbero JM, Otto BA, Carrau RL, Prevedello DM. Quantitative analysis of the surgical exposure and surgical freedom between transcranial and transorbital endoscopic anterior petrosectomies to the posterior fossa. J Neurosurg. 2018 Aug 3:1-9. doi: 10.3171/2018.2.JNS172334. [Epub ahead of print] PubMed PMID: 30074460.