Transorbital endoscopic approach for cavernous sinus exposure

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The endoscopic superior eyelid transorbital approach (SETA) has emerged as a potential alternative to access the cavernous sinus (CS). This approach provides a direct and short minimally invasive route to the anterior and middle cranial fossa. Nevertheless, it uses a narrow corridor that limits its angles of attack.

Several previous studies have attempted to quantitatively compare the traditional open anterolateral skull base approaches with transorbital exposure; however, these comparisons have been limited to the area of exposure provided by the bone opening and trajectory, and fail to account for the main avenues of exposure provided by subsequent requisite surgical maneuvers. The authors quantitatively compare the surgical access provided by the frontotemporal-orbitozygomatic (FTOZ) approach and the SETA following applicable periclinoid surgical maneuvers, evaluate the surgical exposure of key structures in each, and discuss optimal approach selection.

Methods: SETA and FTOZ approaches were performed with subsequent applicable surgical maneuvers on 8 cadaveric heads. The lengths of exposure of cranial nerves (CNs) II-VI and the cavernous internal carotid artery; the areas of the space accessed within the supratrochlear, infratrochlear, and supramaxillary (anteromedial) triangles; the total area of exposure; and the angles of attack were measured and compared.

Results: Exposure of the extradural CS was comparable between approaches, whereas access was significantly greater in the FTOZ approach compared with the SETA. The lengths of extradural exposure of CN III, V1, V2, and V3 were comparable between approaches. The FTOZ approach provided marginally increased exposure of CNs IV (20.9 ± 2.36 mm vs 13.4 ± 3.97 mm, $p = 0.023$) and VI (14.1 ± 2.44 mm vs 9.22 ± 3.45 mm, $p = 0.066$). The FTOZ also provided significantly larger vertical (44.5° ± 6.15° vs 18.4° ± 1.65°, $p = 0.002$) and horizontal (41.5° ± 5.40° vs 15.3° ± 5.06°, $p < 0.001$) angles of attack, and thus significantly greater surgical freedom, and provided significantly greater access to the supratrochlear ($p = 0.021$) and infratrochlear ($p = 0.007$) triangles, and significantly greater exposure of the cavernous internal carotid artery (17.2 ± 1.70 mm vs 8.05 ±

2.37 mm, p = 0.001). Total area of exposure was also significantly larger in the FTOZ, which provided wide access to the lateral wall of the CS as well as the possibility for intradural access.

This is the first study to quantitatively identify the relative advantages of the FTOZ and transorbital approaches at the target region following requisite surgical maneuvers. Understanding these data will aid in selecting an optimal approach and maneuver set based on target lesion size and location [1)]

see also Transorbital endoscopic approach for posterior fossa exposure.

Transorbital endoscopic approach (TOEA) to the cavernous sinus (CS) in which the necessity of lateral orbital rim (LOR) osteotomy is questionable.

This approach, either with or without lateral orbital rim (LOR) osteotomy are feasible for cavernous sinus (CS) exposure. Although the incremental effect of maneuverability is attained following the LOR osteotomy, it should be performed selectively. Additional research is needed to further validate the safety and efficacy, as well as for precisely defining the clinical application of these techniques [2)].

They carried out a lateral canthotomy with cantholysis with subsequent access to the lateral orbital wall and middle cranial fossa in order to reach the petrous apex.

Di Somma et al. from the Department of Neurological Surgery, Hospital Clínic de Barcelona, Department of Neurosurgery, University of Louisville, KY, USA, Division of Neurosurgery, Department of Neurosciences, Reproductive and Odontostomatological Sciences, Università degli Studi di Napoli “Federico II”, Naples, Italy, Laboratory of Surgical Neuroanatomy (LSNA), Faculty of Medicine, Universitad de Barcelona, Spain.agree that this kind of technique is useful to reach the middle fossa and the petrous apex from the transorbital window; however, it is not the only route [3)].

Five human cadaveric heads (10 sides) were dissected at the Laboratory of Surgical NeuroAnatomy of the University of Barcelona. To expose the lateral wall of the cavernous sinus, a superior eyelid endoscopic transorbital approach was performed and the anterior portion of the greater sphenoid wing was removed. The meningo-orbital band was exposed as the key starting point for revealing the cavernous sinus and its contents in a minimally invasive interdural fashion. RESULTS This endoscopic transorbital approach, with partial removal of the greater sphenoid wing followed by a “natural” ventral interdural dissection of the meningo-orbital band, allowed exposure of the entire lateral wall of the cavernous sinus up to the plexiform portion of the trigeminal root and the petrous bone posteriorly and the foramen spinosum, with the middle meningeal artery, laterally. CONCLUSIONS The purely endoscopic transorbital approach through the meningo-orbital band provides a direct view of the cavernous sinus through a simple and rapid means of access. Indeed, this interdural pathway lies in the same sagittal plane as the lateral wall of the cavernous sinus. Advantages include a favorable angle of attack, minimal brain retraction, and the possibility for dissection through the interdural space without entering the neurovascular compartment of the cavernous sinus. Surgical series are needed to demonstrate any clinical advantages and disadvantages of this novel route [4)].

1)

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2)
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