

Endoscopic transorbital approach for skull base and orbital pathologies:

A systematic review and meta-analysis

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Introduction

The Endoscopic Transorbital Approach (ETOA) has emerged as a versatile neurosurgical technique, with increasing evidence over the past two decades supporting its use for lesions of the orbit, orbital apex, infratemporal fossa, and anterior and middle cranial fossae. However, complication rates associated with ETOA have not yet been systematically evaluated.

Objective

To evaluate the complication rates associated with the ETOA in the management of skull base and orbital pathologies.

Methods

- Systematic searches were conducted in PubMed, Embase, Scopus, and Web of Science from inception to July 2025.
- Studies reporting skull base or orbital pathologies treated exclusively with the ETOA, including data on mortality, morbidity, or complications, were included.
- Studies involving mixed surgical approaches, case series with fewer than five patients, and secondary evidence were excluded.
- The study protocol was registered in PROSPERO (CRD420251130069).

Results

- Ten observational studies comprising a total of 212 patients were included.
- A total of 28 distinct pathologies were reported; meningioma was the most frequent lesion (66.0%), followed by dermoid cyst (4.4%), cavernous hemangioma (4.0%), and glioma (3.0%).
- The mean follow-up duration was 24.3 ± 16.8 months.
- A superior eyelid incision was employed in 60% of the included studies.
- CSF leak and wound infection each occurred in 2% of cases (95% CI: 0.00–0.05; I² = 0% for both).
- Ptosis occurred in 1% of patients (95% CI: 0.00–0.04; I² = 4.1%).
- Diplopia was reported in 2% (95% CI: 0.00–0.07; I² = 34.3%), while medial gaze palsy occurred in 3% (95% CI: 0.00–0.07; I² = 49.6%).
- Improvement in visual function was observed in 51% of patients (95% CI: 0.18–0.84; I² = 92.9%), whereas visual dysfunction occurred in 0% (95% CI: 0.00–0.03; I² = 0%).
- Transient facial numbness was reported in 7% of cases (95% CI: 0.00–0.15; I² = 33.6%).
- Mortality was 0% (95% CI: 0.00–0.03; I² = 0%).

Figure 1: Forest plot of cerebrospinal fluid leak

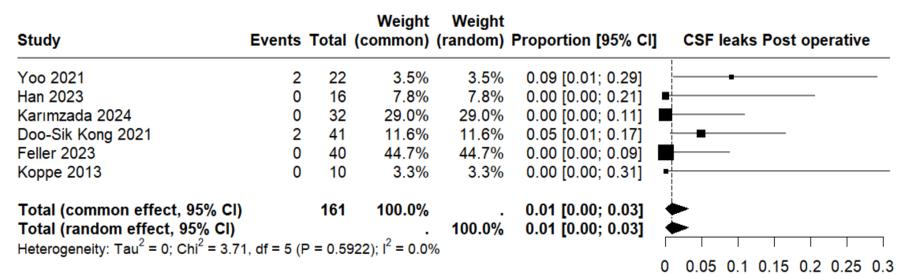


Figure 2: (A) Forest plot, (B) Baujat plot and (C) leave-one-out analysis of recurrence rates

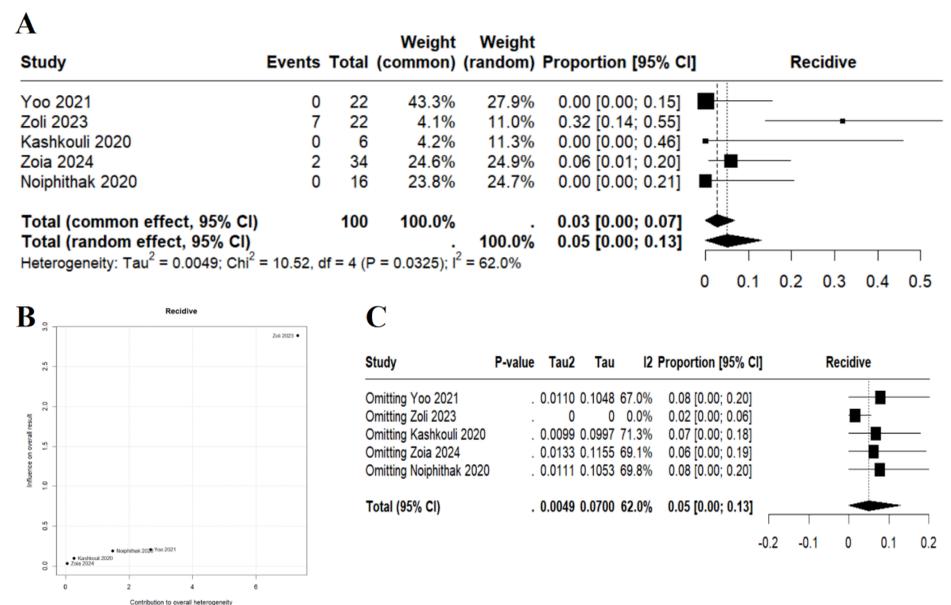
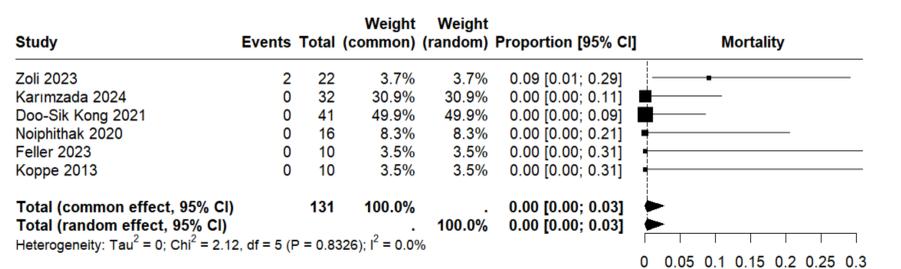


Figure 3: Forest plot of mortality



Conclusion

- ETOA is a safe technique for managing diverse skull base and orbital lesions, with low rates of complications. Functional outcomes are generally favorable, and morbimortality is minimal.
- Future prospective and comparative studies are needed to clarify indications, optimize surgical planning, and standardize outcome reporting.