

Use of a multiportal endoscopic endonasal and transorbital neuroendoscopic approach to pediatric skull base neoplasms: case series and literature review.

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BACKGROUND

Lesions of the pediatric skull base frequently involve multiple sinonasal and intracranial compartments.

Surgical management is complicated by:

- Limited sinus pneumatization
- Immature bony anatomy
- Need to preserve vision, cranial nerve function, and cosmesis

A combined **endonasal and transorbital neuroendoscopic approach** allows:

- Multiple visual vectors
- Instrument triangulation
- Bimanual dissection
- Avoidance of open transfacial or transcranial approaches

Use of this multiportal strategy remains sparsely reported in the pediatric literature.

OBJECTIVE

To present a pediatric case series utilizing a combined multiportal endoscopic transnasal and transorbital approach for anterior skull base neoplasms and to review the limited pediatric literature describing this technique.

METHODS

- IRB-approved retrospective cohort study (2022–2025)
- Inclusion: Patients <18 years undergoing combined endonasal + transorbital neuroendoscopic surgery
- Data reviewed:
 - Demographics
 - Imaging characteristics
 - Surgical technique
 - Intraoperative findings
 - Complications
 - Follow-up outcomes

All cases underwent:

- High-resolution CT and MRI
- Preoperative segmentation and trajectory planning using Mimics software
- Multidisciplinary surgical planning (neurosurgery + otolaryngology)

A focused literature review was conducted on pediatric cases describing transorbital or combined endonasal–transorbital approaches.

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SURGICAL APPROACH

Endoscopic endonasal approach:

- Ethmoidectomy
- Wide sphenoidotomy
- Exposure of medial skull base

Superior eyelid crease transorbital approach:

- Subperiosteal dissection
- Orbital roof removal
- Circumferential tumor debulking
- Image-guided navigation throughout

Reconstruction:

- Free mucosal graft
- Dural substitute (Duragen)
- Tissue sealant
- Lumbar drain in 1 patient for temporary CSF diversion

CASES

Patient	Age	Sex	Pathology	Compartments Involved
1	10	Male	Ossifying fibroma	Frontal sinus, orbit, anterior skull base
2	14	Female	Ossifying fibroma	Frontal sinus, orbit, anterior skull base

RESULTS

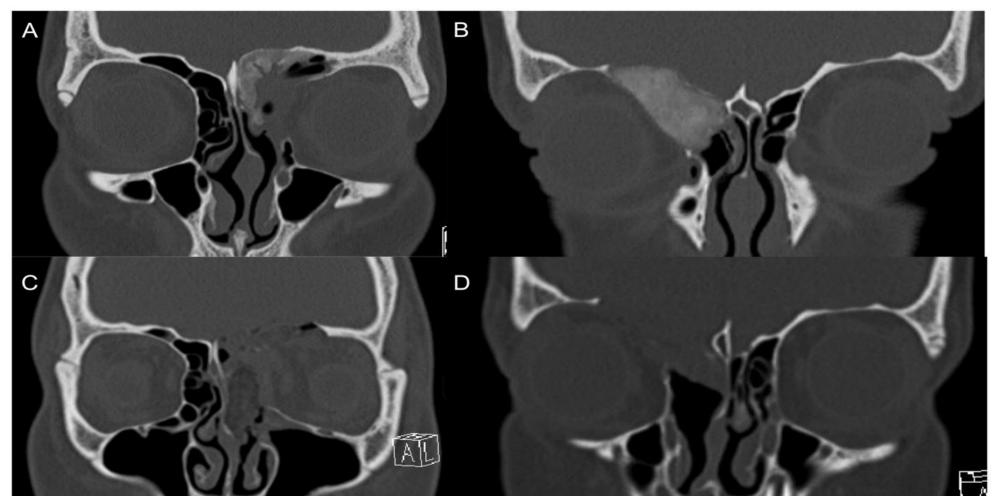


Figure 1. A and B) Representative preoperative CT showing a frontal sinus and orbital skull base mass. (C and D) Representative postoperative CT showing complete resection of respective lesions via a multiportal endoscopic endonasal and transorbital neuroendoscopic approach.

- Gross-total resection achieved in both cases
- One intraoperative low-flow (“weeping”) CSF leak repaired successfully
- No postoperative CSF leak
- No vascular injury
- No permanent cranial neuropathy
- No permanent vision decline
- Transient ipsilateral diplopia in both patients — fully resolved
- **No recurrence at median 14-month follow-up**

LITERATURE REVIEW

Pediatric reports of transorbital or combined multiportal approaches remain limited. Published pediatric indications include: Ossifying fibroma, Optic pathway tumors, Meningioma, Trauma, and Congenital lesions

Key themes in literature:

- Expanded working angles compared to single-corridor approaches
- Improved access to lateral/anterior skull base
- Need for careful management of CSF leak
- Importance of multidisciplinary skull base teams

Our series adds to the limited pediatric data demonstrating safety and efficacy in selected patients.

CONCLUSIONS

A multiportal endoscopic endonasal and transorbital neuroendoscopic approach can safely be utilized for complex lesions of the pediatric skull base. Multiportal access affords improved visualization, expanded working angles, and bimanual instrumentation compared to single-corridor approaches affording complete lesional resection in a single setting in appropriately selected patients.