A Case Series of 6 Pediatric Patients with Lateral Skull Base Encephalocele Repairs including Sternocleidomastoid Flap as an Option

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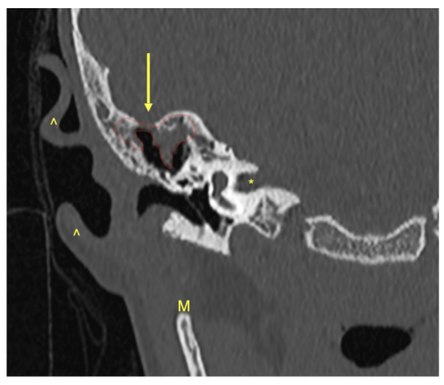
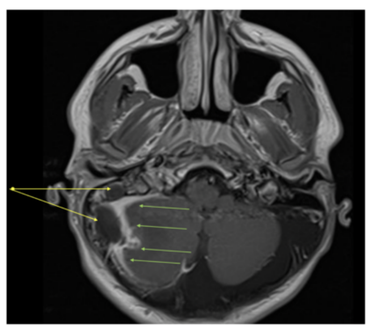
Introduction

Encephaloceles of the lateral skull base are a rare and diverse condition characterized by bone defect with or without herniation of intracranial contents. These defects can predispose patients to complications including meningitis, CSF leak, seizure, and brain abscess. Lateral skull base encephaloceles can occur within the middle or posterior cranial fossae (Fig.1), and thus multiple surgical approaches and materials can be used to repair these defects depending on location and etiology. This study examines different treatment options for this type of defect through a case series of pediatric patients treated via different approaches and highlights a repair using an alternative and less studied autologous sternocleidomastoid muscle graft due to immunocompromise or severe infection. Introducing an autologous graft may prove beneficial given the infection rate for translabyrinthine skull base defect repairs using combined autologous and foreign materials, such as hydroxyapatite cement, has been recorded at 3.9%[1]. Additionally, a vascularized autologous graph, including use of the sternocleidomastoid, may be superior to other nonvascularized autologous grafts, such as fat, which come with complications of fat necrosis around 1%[2].



• Figure 1. CT scan – right ear- coronal view. Middle fossa floor defect (yellow arrow) and cholesteatoma (red outline) seen within mastoid. Internal auditory canal (*), auricle (^), and mandible (M) shown for reference.



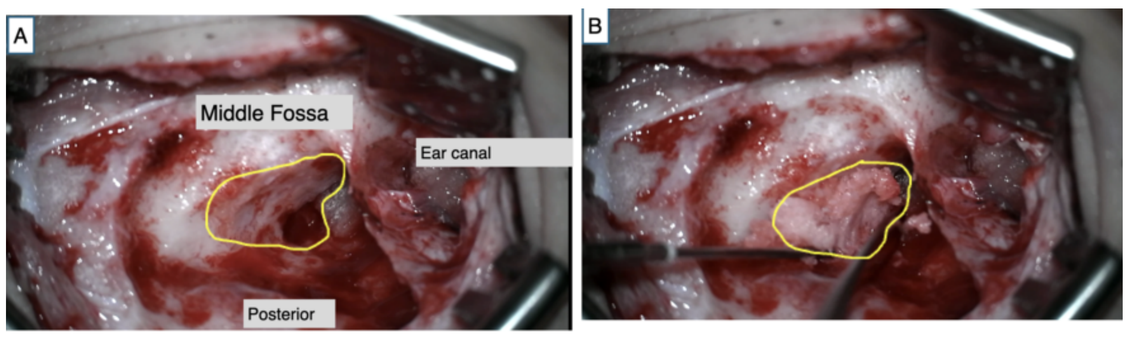
• Figure 2. MR T1-weighted axial with contrast shows right side epidural abscess (yellow arrow) and sigmoid sinus thrombosis (green arrows). After washout, vascularized soft tissue was used to reconstruct the skull base defect.

Methods and Materials

Retrospective chart review was conducted at a tertiary pediatric hospital with comprehensive lateral skull base services including neurosurgery, neurotology, radiation oncology, etc. Patients with lateral skull base encephaloceles were reviewed to analyze surgical approach, materials used for reconstruction, encephalocele etiology, age, and other factors. For closure of the defect in our studied patients, bone cement, bone pate (Fig. 2), and autologous vascularized sternocleidomastoid grafts (Fig. 3) were used.

Results

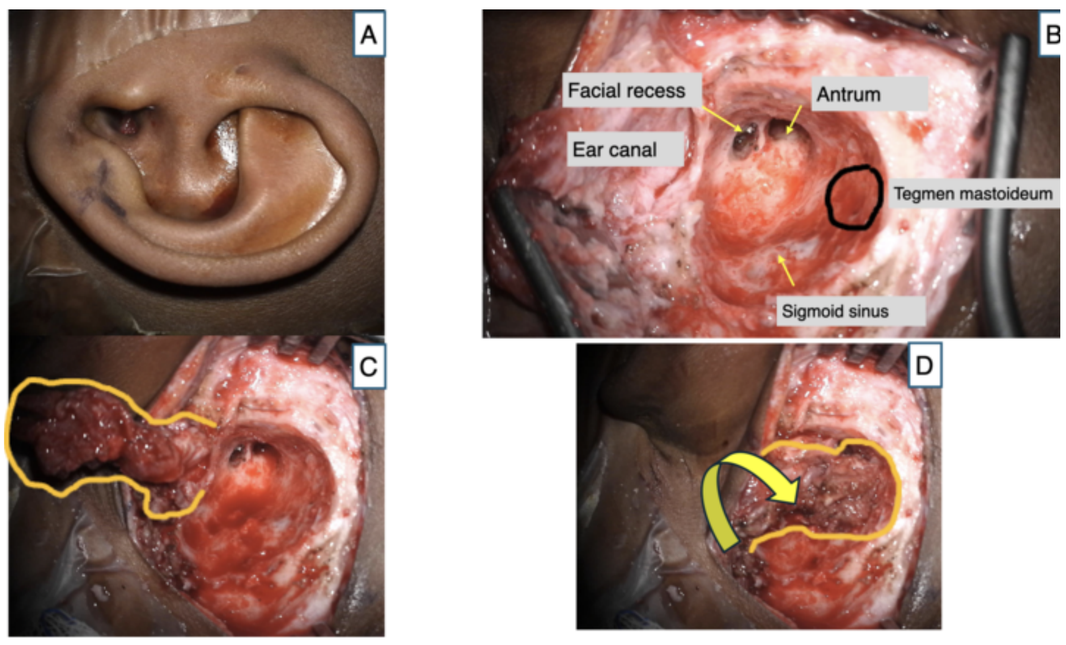
Six (6) pediatric patients with lateral skull base encephaloceles were identified. Three (3) encephaloceles were due to chronic otitis media and/or cholesteatoma and were repaired using bone pate. One (1) patient had cystic fibrous dysplasia of the temporal bone causing encephalocele that was repaired with bone cement via a combined transmastoid and middle fossa craniotomy approach. Finally, two (2) patients were treated using a vascularized sternocleidomastoid graft rotated to repair the defect; both patients were immunocompromised with extratemporal complications of mastoiditis (e.g., sigmoid sinus thrombosis, brain abscess). All repairs were successful without complication.



• Figure 3. Intraoperative photograph of mastoid after cholesteatoma removal. Image A demonstrates skull base defect in tegmen mastoideum with visible middle fossa dura. Image B showcases bone pate placement to repair defect.

Discussion

This case series showcases lateral skull base reconstruction in a pediatric population, which is rare. Therefore, all etiologies and reconstructive techniques were included. 3 patients who had middle cranial fossa encephalocele from tegmen erosion had a repair with bone pate from mastoid cortex. The patient with fibrous dysplasia had encephalocele repair with bone cement, chosen for higher strength and availability given the weak fibrous bone. Finally, the 2 immunocompromised patients had a sternocleidomastoid flap graft placed (Fig. 4) to provide vascularized bulky tissue to repair the defect and promote infection-free healing.



• Figure 4. Intraoperative photographs of left ear surgery. A. External ear prior to surgery to orient the viewer. B. After mastoidectomy has been performed. Facial recess, antrum, tegmen mastoideum. C. Sternocleidomastoid muscle flap (outlined) has been raised and suspended inferiorly. D. Muscle flap rotated into defect at level of skull base.

Conclusion

Lateral Skull base defects in the pediatric population have various etiologies which may steer surgeons towards various approaches and reconstructive materials. This case series showcases how a multidisciplinary approach and using different methods for skull base reconstruction can be tailored to the needs of each patient. Additionally, the use of vascularized sternocleidomastoid graft is described as a possible option for encephalocele repair which has not been well described in the literature.

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References

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