41532 - ENDOSCOPIC REPAIR OF BASAL ENCEPHALOCELE IN CHILDREN: A SYSTEMIC REVIEW

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DISCLOSURE

No disclosure and no conflict of interest

ACKNOWLEDGMENT

We would like to express our deepest gratitude for Anas Alyamani for his ongoing contribution throughout the project.
INTRODUCTION

Surgical repair is recommended for basal encephalocele to prevent meningitis, rhinorrhea, nasal obstruction, and cosmetic deformities. (1,6) The endoscopic approach has begun to replace the traditional open craniotomy techniques and now considered the standard treatment in adults. (4) We performed a systematic review of retrospective studies to further assess the efficacy and safety of endoscopy in the management of basal encephalocele in the pediatric population.
METHODS

We performed a literature search through EMBASE and MEDLINE (1910–2017) to identify articles clearly stating patient with meningocele or meningoencephalocele with or without CSF leak that were treated endoscopically or by a combined open and endoscopic technique. We conducted our systematic review according to the Meta-analysis Of Observational Studies in Epidemiology (MOOSE) guidelines, the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) Statement and the Cochrane Handbook.
RESULTS

A total of 65 articles were identified. Of these 8 (12%) articles met inclusion criteria. All were retrospective reviews. It included a total of 81 patients. Mean age of the patients was 9.3 years. 6 articles mentioned the gender of the patients. 36 (58%) out of 62 patients in these articles were male, while 26 (42%) patients were female.

Figure 1: Flow diagram of included studies following PRIAMSA guidelines
The most common presentation was nasal obstruction which was seen in 32 patients, followed by meningitis which was observed in 29 patients. While, cerebrospinal fluid rhinorrhea was observed in 26 patients. Furthermore, one patient was a case of intractable epilepsy and another patient had hypertelorism.

74 Cases out of the 81 cases underwent endoscopic procedures, while in 3 cases combined endonasal and intracranial approach was used. The average hospitalization duration was 5.7 days (range 4.9 - 8.6 days). While, the mean post-operation follow-up was 24.9 months (range 12-69 months).

In our review 6 (7%) out of the 83 patients developed complications. One article mentioned a case of treatment failure which was treated with combined approach, after one month from the procedure, the patient had cerebrospinal fluid rhinorrhea and died of meningitis after 2 years. One patient had a nasal stenosis post operatively. Furthermore, 4 cases of iatrogenic frontal and ethmoidal mucocele were reported.
<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Total no. of patients</th>
<th>Mean age</th>
<th>Type of defect (meningocele = MC , meningoencephalocele = MEC)</th>
<th>Site of bone defect</th>
<th>Presentation</th>
<th>Repair approach</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodworth</td>
<td>2004</td>
<td>8</td>
<td>6</td>
<td>8 MEC</td>
<td>5 foramen cecum , 3 ethmoid roof/cribriform plate only</td>
<td>3 meningitis (average age, 6 years), 4 CSF rhinorrhea , 3 nasal obstruction.</td>
<td>endoscopic transnasal only</td>
<td>1 nasal stenosis</td>
</tr>
<tr>
<td>Castelnuovo</td>
<td>2009</td>
<td>11</td>
<td>6.1</td>
<td>10 MEC , 1 MC</td>
<td>5 in cribriform plate region (in one of these there were other two malformations located in the petro-clival region and at the medial wall of the cavernous sinus) , 4 lateral to the foramen cecum, anteriorly to the cribriform plate, 1 in ethmoidal roof, 1 lateral recess of the sphenoid sinus (Sternerberg's canal) (This patient also had an associated defect at the petro-clival suture.)</td>
<td>5 nasal obstruction , 5 recurrent meningitis (in two of these, an active rhinorrhea was associated), 1 had active rhinorrhea but no meningitis.</td>
<td>endoscopic transnasal only (7 Paraseptal, 1 Trans-ethmoido-pterygoid-sphenoidal approach, 1 Trans-ethmoidal-sphenoidal-petro-clival approach)</td>
<td>none</td>
</tr>
<tr>
<td>Rocco</td>
<td>2010</td>
<td>28</td>
<td>6.11</td>
<td>28 MEC</td>
<td>14 in the anterior portion of the nasoethmoidal roof , 4 the whole length of the nasal roof.</td>
<td>nasal obstruction (in 9 cases [50%]), CSF rhinorrhea (in 5 [27%]), or meningitis (in 4 [22%]),</td>
<td>transnasal unilateral endoscopic approach in all patients , A combined endonasal and intracranial approach (3 cases)</td>
<td>1 treatment failure , An iatrogenic frontal or ethmoidal mucocele was observed in 4 cases (14%), One patient treated by a combined approach died of meningitis 2 years after surgery</td>
</tr>
<tr>
<td>Gun</td>
<td>2013</td>
<td>11</td>
<td>12.4</td>
<td>11 MEC</td>
<td>5 frontonasal , 1 transphenoid , 5 transethmoid</td>
<td>6 meningitis , 4 rhinorrhea , 3 nasal obstruction</td>
<td>endoscopic transnasal only</td>
<td>none</td>
</tr>
<tr>
<td>Wu</td>
<td>2016</td>
<td>8</td>
<td>9</td>
<td>6 MC , 2 MEC</td>
<td>6 cribriform plate , 2 cribriform plate-sphenoid bone</td>
<td>All of the children exhibited the symptom of nasal or nasopharyngeal obstruction. 5 had neither operative nor traumatic history. 2 had a history of nasal endoscopic surgery and subsequently developed cerebrospinal fluid (CSF) rhinorrhea , 1 had recurrent spontaneous CSF rhinorrhea, and one case had recurrent meningitis; 1 presented with a congenital cleft palate and right middle ear cholesteatoma</td>
<td>7 Transnasal , 1 Transoral</td>
<td>none</td>
</tr>
<tr>
<td>Keshaei</td>
<td>2016</td>
<td>6</td>
<td>7.8</td>
<td>6 MEC</td>
<td>2 cribriform plate 3 anterior ethmoid roof , 1 anterior and posterior</td>
<td>4 meningitis , 1 rhinorrhea , 1 seizure</td>
<td>Endonasal endoscopic repair</td>
<td>One patient had minor complication of nasal alar collapse due to intra-operative adherence of encephalocele to cartilaginous framework</td>
</tr>
<tr>
<td>Abbeele</td>
<td>1999</td>
<td>2</td>
<td>2</td>
<td>2 MC</td>
<td>2 anterior ethmoid roof</td>
<td>1 meningitis , 1 rhinorrhea</td>
<td>Endonasal endoscopic repair</td>
<td>none</td>
</tr>
<tr>
<td>Locatelli</td>
<td>2006</td>
<td>7</td>
<td>8</td>
<td>7 MEC</td>
<td>5 Cribriform Plate, 1 Ethmoid, 1 sphenopterygoid</td>
<td>3 recurrent meningitis , 4 nasal obstruction</td>
<td>Endonasal endoscopic repair</td>
<td>None</td>
</tr>
</tbody>
</table>

**Figure 2: Summary of articles**
DISCUSSION

In our literature review, Mortality was seen in one case (1.2%) which was a combined endonasal endoscopy and transcranial approach out the 81 cases. A.K. Mahapatra et al. mentioned a mortality rate of 3.3% in his retrospective review of open repair cases of basal encephalocele. CSF leak was observed only in one case (1.2%) in our review while K. Mahapatra et al. mentioned a rate of 22%.

Furthermore, one case in our review which is the same case who had the CSF leak, the patient developed meningitis (1.2%), while 10% of the cases in open approach repair developed meningitis post operation. In the open surgical approach, three patients developed wound infections (3.3%), while in our review none had a wound infection. The average hospital stay was 5.7 days for each patient in endoscopic approach patients while it was 8.6 days for patient who underwent open approach. The mean post-operation follow-up was 24.9 months (range 12-69 months) in our study, while it was from 12 to 252 months (mean 99.6 months) in the retrospective review of the open approach.
SUMMARY POINTS

• The endoscopic endonasal approach is a safe and effective technique for repair of basal encephaloceles.

• Endoscopic approach to these lesions had high success rates with lower rates of postoperative complications.

• Perioperative mortality was also lower in the endoscopic group. The endoscopic approach may afford the experienced surgeon the opportunity for successful, long-lasting repair with minimal surgical morbidity.
REFERENCES