Orbital Complications of Acute Sinusitis in Neonates and Infants: A systematic review of 50 years and a case presentation

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Objective: To perform a systematic review over the past 50 years on the diagnosis and treatment of orbital complications in neonates and infants, and report a case.

Study Design: Our case report and a systematic review of the literature for all cases of Subperiosteal Orbital Abscess (SPOA) from acute sinusitis in neonates (<30 days) and infants (30 days to 1 year) over the past 50 years.

Methods: PubMed search was performed to collect all the case reports in English language with SPOA or orbital abscess in this age group in the past 50 years.

Results: Ten cases of SPOA in infants were identified, our case report describing the 11th. Age ranged from 10 to 74 days. There were 6 females and 5 males. The right eye was affected in 5 cases, the left in 5 and both in one case. One reported mortality out of the 11 cases in the literature. Staph Aureus was the most common organism, isolated in nine of 11 cases. Seven cases had open surgical drainage, 2 had endoscopic procedures including ours and one spontaneous rupture. One case that did not have drainage performed expired.

Conclusions: Orbital complications due to ethmoiditis occurs in the pediatric population, and is very rare in neonates and infants. Drainage in this age group appears to be paramount as the only case without surgical or spontaneous drainage expired. With technological advances, endoscopic drainage and removal of the nidus of infection has become safe and effective. We believe this to be the first report dedicated to the evaluation, treatment and outcomes of orbital complications in this age group.

Introduction

Orbital infections are extremely rare in neonates (<30 days) and infants (<1 year). Acute sinusitis is the predominant cause of orbital infections in children. Generally, Streptococcus pneumoniae, Haemophilus influenzae and Moraxella catarrhalis are the offending organisms. Newborns and infants present unique challenges as they still have a developing immune system and share mother’s immunoglobulin. The sinuses are smaller in size and developing. Patients generally present with periorbital redness and swelling with or without systemic symptoms. Treatment often includes empiric intravenous antibiotics directed at typical organisms +/- open drainage.

Case Report

Seventy-four day old female presented with fever, erythema and edema of the left eye. On arrival, WBC was 15.7. Patient was empirically started on IV Ceftriaxone and Clindamycin. CT scan of the sinuses was obtained and showed acute left maxillary and ethmoid sinusitis with a subperiosteal abscess. (Figures 1 and 2). The patient was taken to the operating room. A transnasal endoscopic uncinctomy, maxillary antrostomy, total ethmoidectomy and orbital decompression with removal of lamina papyracea to drain the abscess pocket was performed (figure 3 and 4). Cultures were obtained intra-operatively that grew Oxicillin Resistant Staphlococcus Aureus (ORSA). Ceftriaxone was stopped. Patient improved on clindamycin and was discharged home on a two week course of oral clindamycin.

Abstract

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Table 1: Systematic Review

<table>
<thead>
<tr>
<th>Case</th>
<th>Age (days)</th>
<th>Gender</th>
<th>Laterality</th>
<th>CT performed</th>
<th>Sinus involved</th>
<th>Cultures</th>
<th>Antibiotics</th>
<th>Drainage</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14</td>
<td>F</td>
<td>Right</td>
<td>No</td>
<td>Unknown</td>
<td>Staph aureus</td>
<td>PCN and streptomycin</td>
<td>Open</td>
<td>Cure</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>M</td>
<td>Both</td>
<td>No</td>
<td>Unknown</td>
<td>Staph aureus</td>
<td>PCN and streptomycin</td>
<td>No</td>
<td>Death</td>
</tr>
<tr>
<td>3</td>
<td>35</td>
<td>F</td>
<td>Left</td>
<td>No</td>
<td>Unknown</td>
<td>Diplo pneumoniae</td>
<td>Not reported</td>
<td>Open</td>
<td>Cure</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>M</td>
<td>Left</td>
<td>Yes</td>
<td>Unknown</td>
<td>Staph aureus</td>
<td>Methicillin and streptomycin</td>
<td>Open</td>
<td>Cure</td>
</tr>
<tr>
<td>5</td>
<td>15</td>
<td>F</td>
<td>Left</td>
<td>Yes</td>
<td>Ethmoid</td>
<td>Staph aureus</td>
<td>Ceftriaxone and gentamicin</td>
<td>Open</td>
<td>Cure</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td>M</td>
<td>Left</td>
<td>Yes</td>
<td>Ethmoid</td>
<td>Staph aureus + aspergillus</td>
<td>Clindamycin</td>
<td>Open</td>
<td>Cure</td>
</tr>
<tr>
<td>7</td>
<td>28</td>
<td>F</td>
<td>Right</td>
<td>Yes</td>
<td>Ethmoid</td>
<td>Staph aureus</td>
<td>Ceftriaxone and gentamicin</td>
<td>Open</td>
<td>Endoscopic</td>
</tr>
<tr>
<td>8</td>
<td>17</td>
<td>F</td>
<td>Right</td>
<td>Yes</td>
<td>Ethmoid</td>
<td>Staph aureus</td>
<td>Ceftriaxone and gentamicin</td>
<td>Open</td>
<td>Cure</td>
</tr>
<tr>
<td>9</td>
<td>28</td>
<td>M</td>
<td>Right</td>
<td>Yes</td>
<td>Ethmoid</td>
<td>MRSA</td>
<td>Ceftriaxone and gentamicin</td>
<td>Open</td>
<td>Cure</td>
</tr>
<tr>
<td>10</td>
<td>38</td>
<td>M</td>
<td>Right</td>
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<td>Ethmoid</td>
<td>Staph aureus</td>
<td>Not reported</td>
<td>Open</td>
<td>Cure</td>
</tr>
<tr>
<td>11</td>
<td>74</td>
<td>F</td>
<td>Left</td>
<td>Yes</td>
<td>Ethmoid and Maxillary</td>
<td>ORSA</td>
<td>Clindamycin</td>
<td>Endoscopic</td>
<td>Cure</td>
</tr>
</tbody>
</table>

Systematic Review

Introduction

Orbital infections, though extremely rare, can lead to significant complications including sepsis and mortality. There has been multiple studies favoring conservative management with the use of intravenous antibiotics without the need for surgical drainage in patients under 9 years of age.²³ Our systematic review was limited solely to patients under one year of age. We found that neonates and infants require surgical drainage to successfully resolve the infection. This may be secondary to patients in this age group being a unique subgroup with their developing immune system and small developing sinuses. In addition, noted in our series, this age group appears to be particularly susceptible to staphilococcal species. Intra-veinous antibiotics to include anti-staphilococcal coverage until definitive culture results are available to direct treatment is necessary. Traditionally, external approach with Lynch incision has been used to adequately drain the orbital component of the abscess, however with the advancement in endoscopic equipment and technique, endoscopic drainage has become a good option. The first case of successful endoscopic drainage in a 38 day old was reported by Soon et al in 2011.¹ Our case is the second reported case in this age group.

Discussion

Orbital infections, though extremely rare, can lead to significant complications including sepsis and mortality. There has been multiple studies favoring conservative management with the use of intravenous antibiotics without the need for surgical drainage in patients under 9 years of age.²³ Our systematic review was limited solely to patients under one year of age. We found that neonates and infants require surgical drainage to successfully resolve the infection. This may be secondary to patients in this age group being a unique subgroup with their developing immune system and small developing sinuses. In addition, noted in our series, this age group appears to be particularly susceptible to staphilococcal species. Intra-veinous antibiotics to include anti-staphilococcal coverage until definitive culture results are available to direct treatment is necessary. Traditionally, external approach with Lynch incision has been used to adequately drain the orbital component of the abscess, however with the advancement in endoscopic equipment and technique, endoscopic drainage has become a good option. The first case of successful endoscopic drainage in a 38 day old was reported by Soon et al in 2011.¹ Our case is the second reported case in this age group.

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Results

• Eleven cases of orbital or SPOA were found including ours.
• Five left eye, 5 right eye and 1 both eyes.
• Ethmoid sinus confirmed to be involved in 7 cases. Three cases didn’t have CT scan done and 1 was inconclusive.
• Seven had open drainage performed, 1 spontaneous and 2 endoscopic approach (including ours). One mortality in patient that did not have drainage of the abscess.
• Staph aureus present in 9 of the 11 cases with last two being MRSA/orS.

Conclusion

• We believe neonates and infants should be classified separately from children over the age of 1 in decision making and treating orbital/ subperiosteal abscesses.
• Staph aureus was the most common offending organism in this patient population, even 50 years ago. As such, appropriate coverage for staph must be considered in this age group when empiric antibiotics are chosen.
• It appears drainage in this age group should be considered early for quicker resolution of the disease process.
• Endoscopic approach is a good option that offers excellent results in its ability to open and remove the nidus of infection and drain the abscess pocket without the need for a external incision.

References