Pneumococcal Facial Cellulitis in Children

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ABSTRACT. Objective. To review the epidemiology and clinical course of facial cellulitis attributable to Streptococcus pneumoniae in children.

Design. Cases were reviewed retrospectively at 8 children's hospitals in the United States for the period of September 1993 through December 1998.

Results. We identified 52 cases of pneumococcal facial cellulitis (45 periorbital and 7 buccal). Ninety-two percent of patients were <36 months old. Most were previously healthy; among the 6 with underlying disease were the only 2 patients with bilateral facial cellulitis. Fever (temperature: ≥100.5°F) and leukocytosis (white blood cell count: >15,000/mm³) were noted at presentation in 78% and 82%, respectively. Two of 15 patients who underwent lumbar puncture had cerebrospinal fluid with mild pleocytosis, which was culture-negative. All patients had blood cultures positive for S pneumoniae. Serotypes 14 and 6B accounted for 53% and 27% of isolates, respectively. Overall, 16% and 4% were nonsusceptible to penicillin and ceftriaxone, respectively. Such isolates did not seem to cause disease that was either more severe or more refractory to therapy than that attributable to penicillin-susceptible isolates. Overall, the patients did well; one third were treated as outpatients.

Conclusions. Pneumococcal facial cellulitis occurs primarily in young children (<36 months of age) who are at risk for pneumococcal bacteremia. They present with fever and leukocytosis. Response to therapy is generally good in those with disease attributable to penicillin-susceptible or -nonsusceptible S pneumoniae. Ninety-six percent of the serotypes causing facial cellulitis in this series are included in the heptavalent-conjugated pneumococcal vaccine recently licensed in the United States. PEDIATRICS 2000;106(5). URL: http://www.pediatrics.org/cgi/content/full/106/5/61; Streptococcus pneumoniae, cellulitis, antibiotic resistance.

METHODS

The US Pediatric Multicenter Pneumococcal Surveillance Group consists of investigators from 8 children's hospitals. Since 1993, these investigators have prospectively identified children seen at their centers with invasive disease attributable to S pneumoniae (documented by isolation from a normally sterile body site). For the current study, further information was gathered retrospectively for each case of facial cellulitis identified from September 1, 1993 through December 31, 1998.

The pneumococcal isolates from each center were sent to a central laboratory (Infectious Disease Research Laboratory, Texas Children's Hospital, Houston, TX) where serotyping and susceptibility testing for penicillin and ceftriaxone were performed. Isolates were serotyped by the capsular swelling method using commercially available antisera (Statens Seruminstitut, Copenhagen, Denmark; Daco, Inc, Carpinteria, CA). Susceptibility testing was performed by standard microbroth dilution with Mueller-Hinton media supplemented with 3% lysed horse blood. Susceptibility was defined according to the 1999 National Committee for Clinical Laboratory Standards guidelines for minimal inhibitory concentrations: for penicillin, ≤0.06 µg/mL, susceptible; 1.0–1.9 µg/mL, intermediate; ≥2.0 µg/mL, resistant; for ceftriaxone, ≤0.5 µg/mL, susceptible; 1.0 µg/mL, intermediate; and ≥2.0 µg/mL, resistant. Isolates that were intermediate or resistant were considered nonsusceptible.

The statistical significance of differences in the frequencies of categorical variables was tested with either Fisher's exact test or χ² test for trends. Two-tailed P values <.05 were considered significant.

RESULTS

During the study, 52 patients with facial cellulitis were identified. Forty-five had periorbital and 7 had buccal cellulitis. They ranged in age from 6 weeks to
Patients With Facial Cellulitis and Abnormal CSF Findings

<table>
<thead>
<tr>
<th>Age</th>
<th>CNS Symptoms</th>
<th>Antibiotics Before LP</th>
<th>WBCs/mm³ (% Neutrophils)</th>
<th>RBCs/mm³</th>
<th>Glucose (mg/dL)</th>
<th>Protein (mg/dL)</th>
<th>Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 wk</td>
<td>Irritability</td>
<td>None</td>
<td>18 (52)</td>
<td>760</td>
<td>82</td>
<td>50</td>
<td>Ampicillin IV, 1 dose</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ceftriaxone and vancomycin IV, 2 d</td>
</tr>
<tr>
<td>9 mo</td>
<td>None</td>
<td>Amoxicillin, 2 d</td>
<td>9 (91)</td>
<td>0</td>
<td>76</td>
<td>19</td>
<td>Ceftriaxone and vancomycin IV, 2 d</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ceftriaxone, 1 dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Amoxicillin/clavulanate PO, 8 d</td>
</tr>
</tbody>
</table>

CNS indicates central nervous system; LP, lumbar puncture; WBC, white blood cell; RBC, red blood cell; IV, intravenous; PO, oral.
axone) are outlined in Table 3. All 3 of these patients had periorbital cellulitis. Their clinical courses seem to be similar to patients with penicillin-susceptible isolates.

**DISCUSSION**

Pneumococcus is now likely the most common cause of bacteremic facial cellulitis in children. Our series is by far the largest published to date of pneumococcal facial cellulitis. We have included both periorbital and buccal cellulitis in this series because although there has been much discussion regarding the pathogenesis of each, it is likely that both are associated with pneumococcal bacteremia.

Although proposed by some authors, it is unlikely that buccal cellulitis occurs via lymphatic spread from ipsilateral otitis media. Our finding of otitis media in 43% (3 of 7 patients) with buccal cellulitis is similar to 38% noted in a previous series. In our series, in 1 of these 3 only the contralateral ear was involved. In the above noted series of cases accumulated before the eradication of disease attributable to *H influenzae* type b, 35 of 38 bacteremic patients with buccal cellulitis had disease attributable to *H influenzae* type b, while nontypeable *H influenzae* causes otitis media.

Similarly, although proposed by some authors, it is unlikely that sinusitis plays a major role in the pathogenesis of periorbital cellulitis. In our series, radiologic studies of the sinuses were abnormal in all 10 patients who underwent such studies; however, these abnormalities may be attributable to overlying soft tissue swelling and/or mild upper respiratory tract illness. Upper respiratory tract symptoms were noted in 59% of patients with periorbital cellulitis (and in 57% of those with buccal cellulitis). Further, before the eradication of disease attributable to *H influenzae* type b, although this organism was commonly noted to cause bacteremic periorbital cellulitis, it is again nontypeable *H influenzae* that causes sinusitis.

Pneumococcal facial cellulitis occurs in patients at high risk for pneumococcal bacteremia, ie, children younger than 36 months of age (92% of our patients) who present with fever and leukocytosis. Of interest, both of the patients in our series with bilateral periorbital cellulitis had underlying immunodeficiency. In patients who present with bilateral facial cellulitis, if an underlying immunodeficiency has not already been diagnosed, an evaluation for such might be considered. Also of interest, a violaceous hue was noted in 6 of our patients with pneumococcal facial cellulitis. Although once thought to be indicative of cellulitis attributable to *H influenzae* type b, others have noted the occurrence of a violaceous hue with pneumococcal disease as well.

There is controversy regarding the need for lumbar puncture in the evaluation of infants and young children with facial cellulitis. In one series among 73 children with bacteremic facial cellulitis who underwent lumbar puncture, 7 had culture-positive CSF (1 attributable to *S pneumoniae*; some of these 7 had minimal or no meningeal signs (or abnormalities noted in CSF). These 7 patients ranged in age from 7 weeks to 14 months. Since that series was published, others have commented on the subsequent overuse of lumbar puncture in the evaluation of patients with facial cellulitis. In our series of 15 patients who underwent lumbar puncture, 2 (including a 9-month-old with no meningeal signs) were found to have mild CSF pleocytosis (Table 1). The significance of the pleocytosis is not clear. The CSFs of these patients were culture-negative, although one had been pretreated. The 10-week-old received only 2 days of parenteral therapy and did well. Lumbar puncture should be considered carefully for patients with facial cellulitis who are <15 to 18 months of age and possibly bacteremic (ie, those presenting with signs of systemic illness including fever or leukocytosis).

During the years of this study, among the 51 isolates from patients with bacteremic facial cellulitis, we did not demonstrate a statistically significant increase in the percent of cases due to penicillin-nonsusceptible pneumococci. However, in the years 1994–1995, 3 of 28 isolates (11%) were nonsusceptible to penicillin while in the years 1996–1998, 5 of 22

**TABLE 3.** Clinical Courses of Patients With Penicillin-Resistant Pneumococci

<table>
<thead>
<tr>
<th>Age (Months)</th>
<th>Serotype</th>
<th>MIC (μg/mL) Penicillin/ Ceftriaxone</th>
<th>Hospitalized? No. Days Fever No. Days Hospitalized</th>
<th>Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>6B</td>
<td>2/1</td>
<td>No</td>
<td>Ceftriaxone, 1 d</td>
</tr>
<tr>
<td>21</td>
<td>NT</td>
<td>2/1</td>
<td>Yes</td>
<td>Amoxicillin/clavulanate, 10 d</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>Ceftriaxone, 3 d</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>Oxacillin, &lt;1 d</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>Amoxicillin, 7 d</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>Cefotaxime, 3 d</td>
</tr>
<tr>
<td>8</td>
<td>6B</td>
<td>2/.5</td>
<td>Yes</td>
<td>Clindamycin, 10 d</td>
</tr>
</tbody>
</table>

MIC indicates minimal inhibitory concentration; NT, nontypeable.
(23%) were nonsusceptible ($P = .27$). Previously, our group did note a significant increase in the percent of pneumococcal isolates nonsusceptible to penicillin during the years 1993–1996 when evaluating 1283 isolates from children with systemic pneumococcal infection. In the current series, patients who had received $\beta$-lactam antibiotics in the previous 30 days were more likely to have disease due to pneumococcus that was nonsusceptible to penicillin. Such an association with recent prior antibiotic use was noted in our previous series and by others.

Our patients with facial cellulitis generally responded well to therapy. One-third were treated as outpatients. Those admitted generally had short durations of fever and hospitalization as has been noted in other series of children with facial cellulitis. Isolates of $S$ pneumoniae that were nonsusceptible to penicillin (including 3 resistant to penicillin) did not seem to cause disease that was either more severe or more refractory to therapy than did penicillin-susceptible isolates.

The heptavalent-conjugated pneumococcal vaccine recently licensed in the United States includes pneumococcal serotypes 4, 6B, 9V, 14, 18C, 19F, and 23F. These 7 serotypes accounted for 47 of 49 isolates (96%) from our patients with facial cellulitis (Table 2). Continued surveillance of invasive disease attributable to $S$ pneumoniae, including facial cellulitis, will, of course, be especially important as conjugated pneumococcal vaccines become widely used.

ACKNOWLEDGMENT

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REFERENCES

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