al. (8), who found 80% mortality in their intensive care patients with Candida endophthalmitis. The high mortality in our series may be explained by the composition of the study population, i.e. critically ill patients with high APACHE II scores, which is an independent risk factor for mortality in patients with candidemia (11).

The incidence of hematogenous Candida endophthalmitis in non-neutropenic critically ill patients is increasing. Thus, frequent eye examination by an ophthalmologist should be performed routinely in this population. Clinical trials to evaluate the efficacy of fluconazole in the treatment of Candida endophthalmitis are needed.

References


Colonization and Infection with Moraxella catarrhalis in Childhood

R. Berner*, R.F. Schumacher, M. Brandis, J. Forster

In a prospective clinical study, rates of isolation of Moraxella catarrhalis in nasopharyngeal aspirates from 122 children with respiratory tract infection and 72 healthy controls were compared. In the patient group, Moraxella catarrhalis and Streptococcus pneumoniae were the most frequently isolated pathogens (38% and 42%, respectively). Monocultures of each pathogen were equally distributed in patients and controls (41% vs. 42%), whereas mixed infections were found more frequently in the patient group (42% vs. 14%; normal flora, 17% vs. 44%). Moraxella catarrhalis appears to be a relevant respiratory pathogen. The isolation of two or more pathogens in nasopharyngeal aspirates seems to be as indicative of relevant infection as is monoculture.

In the last decade the gram-negative diplococcus Moraxella catarrhalis, formerly known as Branhamella catarrhalis, “has gained respect as a pathogen” (1). Moraxella catarrhalis is a frequent cause of otitis media in infants and children and of low-
er respiratory tract infections in adults, especially in those with chronic bronchitis and emphysema (2). The significance of isolation of *Moraxella catarrhalis* in respiratory tract specimens, however, is difficult to assess because a relevant proportion of obviously asymptomatic carriers is found. Colonization rates of 3 to 58% in asymptomatic carriers have been reported, depending on age (3, 4). In children with respiratory tract infection, isolation rates between 17 and 71% have been observed (5, 6). Darelid et al. (7) showed that, in children with longstanding *Moraxella catarrhalis*-associated cough, only the elimination of this bacterium after antibiotic treatment was correlated to clinical recovery.

The aim of our study was to compare isolation rates of *Moraxella catarrhalis* in children with acute respiratory tract infections to those in healthy controls. The intention was to investigate if the prevalence of *Moraxella catarrhalis* may give evidence for its role in the pediatric setting. Furthermore, we wanted to identify the significance of a common laboratory finding of cultivation of two or more bacteria or viruses including *Moraxella catarrhalis* in respiratory tract specimens. In addition, susceptibility to common antibiotics was tested. For *Moraxella catarrhalis* different testing methods were compared.

**Patients and Methods.** During a period of six months (November 1991 to April 1992), 221 children with respiratory tract infections were admitted to the University Children’s Hospital, Freiburg, Germany. A respiratory tract infection had to be diagnosed for subjects to enter the study. Sixty-seven of the children were excluded because of antibiotic treatment within seven days prior to admission. Another 32 patients were excluded because they did not meet the criterion of having a respiratory tract infection of relevant severity, as determined by a clinical scoring system using signs and symptoms (data not shown). Thus, 122 patients were enrolled in the study. Seventy-six children admitted to the hospital for elective surgery during the same time period were required to be free of respiratory infections for reasons of anesthesia, and were considered for inclusion in the control group. Four children had to be excluded because of prior antibiotic treatment. Thus, 72 children were assigned to the control group.

Within the patient group, the age range was 1 month to 12 years (median, 1 year); there were 77 boys and 45 girls. Within the control group, the age range was 4 months to 16 years (median, 1 year and 9 months); there were 53 boys and 19 girls. In the patient group, nasopharyngeal aspirates and throat swabs were taken at the time of diagnosis and, in the control group, at the beginning of anesthesia. Aspirates and throat swabs were cultured and bacteria were identified by standard procedures (8).

Virus antigen (respiratory syncytial virus, adenovirus, influenza virus type 1, 2, and 3, and parainfluenza virus type A and B) was measured after ultrasound sonification of the specimen by the enzyme-linked immunosorbent assay technique using antigen from Halonen (University of Turku, Finland). Sensitivity and specificity of this assay have been calculated to be 93% and 97%, respectively (9). Antimicrobial susceptibility testing was performed by the agar diffusion method according to the National Committee for Clinical Laboratory Standards (10). Beta-lactamase production was tested with the chromogenic cephalosporin nitrocefin. All *Streptococcus pneumoniae*

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### Table 1: Isolation rates among children younger than one year (Group 1), children from one to three years (Group 2), and children three years and older (Group 3).

<table>
<thead>
<tr>
<th>Pathogen isolated</th>
<th>Patients</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group 1</td>
<td>Group 2</td>
<td>Group 3</td>
<td>Group 1</td>
<td>Group 2</td>
<td>Group 3</td>
</tr>
<tr>
<td>H. influenzae</td>
<td>16</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>M. catarrhalis</td>
<td>27</td>
<td>14</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>S. pneumoniae</td>
<td>29</td>
<td>13</td>
<td>9</td>
<td>0</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>S. aureus</td>
<td>6</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>RSV</td>
<td>14</td>
<td>7</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Sterile/physiological flora</td>
<td>5</td>
<td>10</td>
<td>6</td>
<td>6</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>Monoinfection</td>
<td>31</td>
<td>13</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Mixed infection</td>
<td>29</td>
<td>15</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

n.s., not significant; RSV, respiratory syncytial virus.