Case report

Bacteremia due to Moraxella osloensis: a case report and literature review

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A B S T R A C T

Herein we report the case of a 10-year-old boy with an autosomal mosaic mutation who developed bacteremia. The causative agent was identified as Moraxella osloensis by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry and 16S rRNA gene sequencing. In the pediatric population, there have been 13 case reports of infection attributed to M. osloensis and this is the fifth reported case of pediatric bacteremia due to M. osloensis. After Moraxella species infection was confirmed, the patient recovered with appropriate antimicrobial therapy. It is important to consider that M. osloensis can cause serious infections, such as bacteremia, in otherwise healthy children.

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Introduction

Moraxella osloensis is an aerobic, Gram negative coccobacillus. It can be isolated from healthy human respiratory tracts, but has been reported as a rare pathogen in immunocompromised individuals, like patients with cancer, leukemia, and organ transplant recipients.\textsuperscript{1} However, it is not well known as a pediatric pathogen. Here, we report a pediatric case of bacteremia due to M. osloensis, with a partial review of the literature.

Case report

The patient was 10-year-old boy with an autosomal mosaic mutation [46XY,t(9;15)(p22;p13),46XY,der(9)t(9;15)(p22;p13)]. He had mild intellectual disability and a substantial history of infectious diseases, including pneumonia, otitis media, sinusitis, and urinary tract infection due to Escherichia coli. He received prophylactic trimethoprim–sulfamethoxazole until six years of age. His immune function was normal, including number of neutrophils, immunoglobulins, and complement. In recent years, he had been doing well without medication.

The patient visited Kofu Municipal Hospital with a 10-day history of fever, cough, and sore throat, and he had been
M. osloensis was first described by Bøvre in 1947 and has been isolated in various environments, including hospitals. In the pediatric population, there have been 13 case reports of infection attributed to M. osloensis including four cases of bacteremia (Table 1). This is the fifth reported case of pediatric bacteremia due to M. osloensis, to the best of our knowledge. In contrast to older patients, the majority of these infections were found in patients that did not have underlying medical conditions.

The appropriate treatment for invasive M. osloensis infection has not been studied. Most reported isolates have been susceptible to penicillin and cephalosporins, but penicillin-resistant strains of M. osloensis (minimum inhibitory concentration of 6.25 µg/mL) have been reported. Among Moraxella species, M. catarrhalis, M. lacunata, and M. nonliquefaciens are known to produce BRO β-lactamase, which degrades penicillin and a part of first-generation cephalosporin. It remains to be clarified whether or not M. osloensis produces BRO β-lactamase. We chose ceftriaxone as a definitive therapy because of its performance against BRO β-lactamase and effectiveness against other Moraxella species.

M. osloensis is difficult to identify because of the presence of several other species with similar phenotypic characteristics. MALDI-TOF MS is a tool for rapid, accurate, and cost-effective identification of cultured bacteria and fungi based on automated analysis of the mass distribution of bacterial proteins. The organism in this case was identified by this method and confirmed furthermore by 16S RNA sequence analysis, which is the most reliable method for species-level identification.

Herein we report a rare pediatric case of bacteremia caused by M. osloensis. The patient recovered with antimicrobial therapy, but it is important to consider that M. osloensis can cause serious infections, such as bacteremia, in otherwise healthy children.

**Table 1 - Clinical characteristics of Moraxella osloensis bacteremia in children.**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Age(y)</th>
<th>Sex</th>
<th>Clinical History</th>
<th>Clinical manifestation(s)</th>
<th>Without bacteremia</th>
<th>Approach for identification</th>
<th>Treatment</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butzler et al.</td>
<td>2/M</td>
<td>M</td>
<td>None</td>
<td>Stomatitis, Impetigo</td>
<td>Laboratory culture</td>
<td>Amoxicillin</td>
<td>Recovered</td>
<td></td>
</tr>
<tr>
<td>Shah et al.</td>
<td>2/M</td>
<td>M</td>
<td>None</td>
<td>Laboratory culture</td>
<td>Laboratory culture</td>
<td>Cefoxime, ST</td>
<td>Recovered</td>
<td></td>
</tr>
<tr>
<td>Dien Bard et al.</td>
<td>3/M</td>
<td>M</td>
<td>Cortical dysplasia and</td>
<td>Prolonged hypotension</td>
<td>4S rRNA</td>
<td>Piperacillin/tazobactam</td>
<td>Recovered</td>
<td></td>
</tr>
<tr>
<td>Minami et al.</td>
<td>9/M</td>
<td>M</td>
<td>Cerebral palsy</td>
<td>Possible cholecystitis</td>
<td>16S rRNA</td>
<td>Cefmetazole</td>
<td>Recovered</td>
<td></td>
</tr>
<tr>
<td>Present patient</td>
<td>10/M</td>
<td>M</td>
<td>Mild intellectual disability</td>
<td>Prolonged fever</td>
<td>MALDI-TOF MS, 16S rRNA</td>
<td>Meropenem, ceftriaxone</td>
<td>Recovered</td>
<td></td>
</tr>
</tbody>
</table>

M, male; ST, trimethoprim-sulfamethoxazole; 16S rRNA, 16S RNA gene sequencing; MALDI-TOF MS, matrix-assisted laser desorption/ionization time-of-flight mass spectrometry.

**Discussion**

M. osloensis was first described by Bøvre in 1947 and has been isolated in various environments, including hospitals. In the pediatric population, there have been 13 case reports of infection attributed to M. osloensis including four cases of bacteremia (Table 1). This is the fifth reported case of pediatric bacteremia due to M. osloensis, to the best of our knowledge. In contrast to older patients, the majority of these infections were found in patients that did not have underlying medical conditions.

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**Conflicts of interest**

The authors declare no conflicts of interest.
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REFERENCES