

Short Communication

A Pediatric Case of Bacteremia and Possible Cholecystitis Due to *Moraxella osloensis*

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SUMMARY: We encountered a pediatric case of bacteremia and possible cholecystitis due to *Moraxella osloensis* that was treated successfully. We confirmed the diagnosis with the presence of a high serum titer of the antibody to the organism. Furthermore, 16S rRNA sequencing was performed to identify the bacteria.

Moraxella osloensis is an aerobic, oxidase-positive, Gram-negative coccobacillus that has been isolated widely from different environments, including hospital settings, and is also thought to be a commensal organism in the upper respiratory tract of humans (1). However, unlike *Moraxella catarrhalis*, it is not well known as a human pathogen. We experienced a pediatric case of bacteremia and possible cholecystitis due to *M. osloensis*.

The patient was a 9 year-old boy who had been in a long-term hospitalization because of cerebral palsy due to severe birth asphyxia and hypoxic ischemic encephalopathy. He had had a tracheostomy and been mechanically ventilated since infancy. He had been dependent on parenteral nutrition through a central venous catheter for years, and had developed many catheter-related bloodstream infections. Eventually, enteral nutrition through a nasogastric tube was reestablished; the central line was removed when he was 9 years and 5 months old. During times when his condition was stable, he had been able to spend time at home for several days to weeks between hospitalizations.

His history of infectious disease included multiple urinary tract infections, bloodstream infections (due to *Staphylococcus aureus*, *Bacillus* species, *Candida parapsilosis*, etc.), and cholecystitis/cholangitis due to cholelithiasis.

One month after the removal of the central venous catheter, he developed low-grade fever and tachycardia with cool extremities (or hypoperfusion). He was admitted to Nagano Children's Hospital, and his urine and blood samples were sent for cultures. Intravenous cefmetazole was started initially because of the suspicion of urinary tract infection. The blood culture yielded *M. osloensis*. The urine culture yielded *Serratia marcescens*; however, it was considered a contamination. The cul-

ture from tracheal aspiration did not yield *Moraxella* species and *S. marcescens*. The susceptibility of *M. osloensis* to cefmetazole was excellent (susceptibilities to antimicrobial agents are shown in Table 1); therefore, the antimicrobial agent was continued for 10 days.

The laboratory data on admission were as follows: white blood cells 13,860/ μ l, 86% neutrophils and 8% lymphocytes, hemoglobin 15.0 g/dl, platelets 17×10^4 /mm, ALT 156 IU/l, G-GTP 870 IU/l, total bilirubin 3.4 mg/dl, direct bilirubin 2.7 mg/dl (serum levels of bilirubin and liver enzymes had significantly increased from previous values), blood glucose 101 mg/dl, and CRP 9.1 mg/dl.

Abdominal ultrasonography revealed multiple cholelithiasis and thickening of the gallbladder wall, which were compatible to cholecystitis. The infection was treated successfully, and the patient recovered to his previous physical status. We did not perform endoscopic retrograde cholangio-pancreatography or bile fluid culture because the patient could not endure these invasive procedures.

One set of blood culture was obtained, and at 48 h after collection, one aerobic blood culture bottle tested positive in the BACTEC FX system (Nippon Becton Dickinson, Tokyo, Japan), yielding a Gram-negative small rod. The Gram-negative organism was subcultured in blood agar, chocolate agar, and Drigalski agar (all from Nippon Becton Dickinson). All results were positive for bacterial growth, which was identified as *Moraxella* species by using ID test HN-20 (Nissui Pharmaceutical, Tokyo, Japan).

Table 1. Antimicrobial susceptibility of *Moraxella osloensis*

Antimicrobial agent	Disk diffusion method (mm)
Penicillin	22
Ampicillin	30
Cefmetazole	29
Gentamycin	24
Imipenem	31
Erythromycin	24
Levofloxacin	21
Sulfamethoxazole/Trimethoprim	26

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The isolate was asaccharolytic, oxidase positive, catalase positive, and indole negative. Positive bacterial growth on 0% NaCl nutrient broth was observed.

To obtain a definitive identification of the organism, 16S rRNA gene sequencing was performed. The 16S rRNA gene fragments were amplified by using standard methods. The coding 16S rRNA region of 1,387 bp was directly sequenced as described elsewhere (2), by using the DTCS Quick Smart Master Mix kit (Beckman Coulter, Brea, CA, USA) and a model CEQ 2000XL DNA analysis system (Beckman Coulter).

Sequencing data were analyzed by comparison of the consensus sequences with GenBank sequences, by using Ribosomal Database Project-II data and the Basic Local Alignment Search Tool software. The percentage similarities were 99.5% to *Enhydrobacter aerosaccus* type strain ATCC2709 (GenBank/EMBL/DDBJ accession no. AJ550856) and 100% to *M. osloensis* (GenBank/EMBL/DDBJ accession no. AB643591), including in the non-type strain analysis.

For the serological corroboration of the diagnosis, classical tube agglutination test was performed. The isolated bacterial lawn (antigen) was suspended in physiological saline and sterilized at 121°C for 15 min. Then, the suspension was washed twice and adjusted to 1.0 McFarland turbidity. The sera of the patient and the controls were inactivated at 56°C for 30 min. The serum was diluted serially with physiological saline and finally prepared in dilutions of 1:20, 1:40, ..., 1:1,280. Each 0.5 ml of the bacterial suspension was added to 0.5 ml of the diluted sera in the tubes; then, the tubes were incubated in a 35°C water bath for 6 h at room temperature overnight. If agglutination was visible, the results were considered positive.

The results were as follows: the titer of our patient was 1:1,280 and those of controls (healthy adults) were 1:20, 1:40, and 1:20.

There had been several reports about the invasive infections caused by *M. osloensis* both in children and in older patients with cancer. To the best of our knowledge, this is the fourth case report of pediatric bacteremia due to this organism (3–5).

Moraxella osloensis has been isolated widely from different environments, including hospital settings, and is also thought to be an inhabitant of the human upper respiratory tract (1). *Moraxella osloensis* is a rare causative agent of human infections, and most reported cases were in immunocompromised patients, such as cancer patients receiving chemotherapy and post-organ transplantation patients (6,7). Serious infections caused by *M. osloensis* are bacteremia, central line-associated bloodstream infection, meningitis, osteomyelitis, and arthritis.

In the pediatric population, there have been 10 case

reports of infection attributed to *M. osloensis* (3–5,8–13). To the best of our knowledge, there has been no report on *M. osloensis* cholangitis. This patient has had multiple gallstones for years and a history of chronic cholecystitis; therefore, the entry of bacteria into the blood stream was supposed to be the intestinal tract through the bile duct. This hypothesis was supported by the obvious deterioration of cholangitis during the episode and the absence of *M. osloensis* in the respiratory specimen of the patient.

Moraxella osloensis can cause serious infections such as bacteremia. Relatively rare pathogens can cause severe infection in handicapped patients, and this possibility should always be considered. Moreover, 16S rRNA sequencing analysis is highly useful for detecting bacterial pathogens, especially uncommon organisms.

Conflict of interest None to declare.

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