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Sphingobacterium multivorum Bacteremia and Acute Meningitis in an Immunocompetent Adult Patient: A Case Report

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Abstract

Introduction: *Sphingobacterium multivorum* is a Gram-negative, nonfermentative bacillus that rarely causes disease in humans. In the medical literature, only a few cases of infections caused by this organism have been reported. Almost all the reported cases of this infection were associated with conditions that decrease immunity.
Case Presentation: To the best of our knowledge, we are reporting the first case of bacteremia and acute meningitis caused by *S. multivorum* in a young immunocompetent adult.

Keywords: Immunocompetent, Bacteremia, Meningitis, *Sphingobacterium multivorum*

1. Introduction

Sphingobacterium multivorum belongs to the genus *Sphingobacterium*. *S. multivorum* is a nonfermentative bacilli with Gram-negative rods. It produces catalase and oxidase and was previously classified as *Flavibacterium*. It is named *Sphingobacterium* because its cell wall contains a high concentration of sphingolipids. The genus *Sphingobacterium* is ubiquitous in nature and consists of multiple species, but only few species have been reported to cause infections in humans, including *S. mizutae*, *S. multivorum*, *S. spiritorum* and *S. thalpophilum* (1).

S. multivorum (initially known as CDC IIK biotype-2 strain) is usually isolated from soil, plants, foodstuff, and water sources, including those in hospitals (2). In the medical literature, there are only few reports of infections caused by *S. multivorum*. The infection has primarily been reported in immunocompromised patient populations, such as patients with diabetes mellitus (3), end-stage renal disease patients who are undergoing hemodialysis (4), patients with malignant cancer who are undergoing chemotherapy (5), chronic alcoholic liver disease (6), HIV patients, or cystic fibrosis patients (7, 8). In these reports, *S. multivorum* has caused blood stream infection, spontaneous bacterial peritonitis, meningitis, and lung infections. We are reporting a case report of bacteremia and acute meningitis caused by *S. multivorum* in a young, healthy, immunocompetent adult patient admitted to the infectious disease unit at Rashid hospital in Dubai.

2. Case Presentation

A 28-year-old Emirati police cadet, who was not known to have any previous medical illness, attended the accident and emergency department of Rashid hospital on May 28, 2010 with complaints of headache and fever that had lasted for one day. There was no history of sore throat, cough, or other symptoms. A clinical examination of the patient was unremarkable. The patient was discharged from the emergency room and given oral amoxicillin clavulanic acid (Augmentin) and ibuprofen. The patient revisited the accident and emergency department after two days. During those two days, he remained febrile and continued to have a headache. He also started vomiting and was feeling quite exhausted and unwell. At this time, he recalled that two weeks before, he sustained a trauma to his right knee and left elbow joints while doing a field exercise in the desert.

Clinically, the patient was conscious, oriented with a GCS score of 15/15. He was febrile but vitally stable. There was mild petechial rash over his chest, back, and lower limbs. There were scabs over his right knee and left elbow joints due to the previous trauma. The signs of meningeal irritation (neck stiffness and Kernig's signs) were also posi-

tive, but there was no focal neurological deficit. The rest of the physical examination was unremarkable.

The patient was admitted to the hospital after routine investigations, septic workup, a CT brain scan, and a lumbar puncture. Considering the initial hematological results and CSF findings, he was started empirically on IV acyclovir (10 mmg/Kg) and 2 gm of IV ceftriaxone BD.

2.1. Laboratory Results

The patient's laboratory results were as follows: WBC 18.6 $\times$ 10^3 cells/μL (N-75%), Hb: 13.8 gm/dL, platelets: 188 $\times$ 10^3 cells/μL, CRP: 131 mg/L, HIV: Ab -ve, RBS: 99 mg/dL. The patient's hepatic and renal profiles were normal. His chest X-ray and CT brain scan were also normal.

2.2. CSF Analysis

An analysis of the patient's CSF returned the following results: WBC: 150 cells/cmm (mostly lymphocytes), RBC: nil, protein: 63 mg/dL (15 - 45 mg/dL), glucose: 67 (serum glucose 99 mg/dL). The patient's Gram stain was negative and his CSF culture did not grow any organism.

2.3. Blood Culture

The patient's blood was collected for cultures in BacT/ALERT blood culture system bottles (BioMerieux, France) on May 28, 2010. The system signaled positive growth after 30 hours of incubation. A Gram stain of the culture showed Gram-negative rods. On subculture, the bacteria showed convex, smooth, opaque 1-mm colonies after 48 hours of incubation at 37°C on blood agar and chocolate agar but weak growth on MacConkey agar. The isolate was positive for oxidase, catalase, and urease. A full identification of the isolate as a *S. multivorum* was made using the VITEK II system (BioMerieux, France). Antimicrobial susceptibility against 14 antibiotics was evaluated using the same VITEK II system. The isolate was resistant to ampicillin, piperacillin, imipenem, cefazolin, cefoxitin, gentamicin, and amikacin. It had intermediate susceptibility to amoxicillin-clavulanic acid and ceftazidime with a MIC of 16 μg/mL, and it was susceptible to ceftriaxone (MIC 8 μg/mL), cefotaxime (MIC 8 μg/mL), cefepime (MIC 2 μg/mL), ciprofloxacin (MIC 1 μg/mL), tetracycline (MIC 4 μg/mL), and trimethoprim-sulfamethoxazole (MIC $<$ 20 μg/mL). The interpretive criteria used to determine antibiotic susceptibility were in accordance with the clinical and laboratory standards institute's susceptibility testing standards for non-Enterobacteriaceae (9).

After receiving the blood culture report, acyclovir was stopped but ceftriaxone was continued. The patient made an excellent recovery and was discharged from the hospital when his symptoms subsided after ten days. His laboratory parameters returned to the reference values and repeated blood cultures became negative.

3. Discussion

S. multivorum has been reported to be a rare microorganism that causes disease in patients with predisposing conditions except for one reported case of septicemia in an infant with normal immunity. However, the living condition of the infant and mother were suboptimal, which might have compromised the hygiene of the infant, predisposing the infant to septicaemia (10). In our case, the patient was an immunocompetent and previously healthy adult.

Our patient presented with clinical signs of meningitis (neck stiffness and Kernig's sign), and a diagnosis of meningitis was further endorsed by the findings of the CSF analysis, leukocytosis, and a positive blood culture. Although the CSF findings were not clearly suggestive of bacterial meningitis, these findings could explain the patient's partial response to amoxicillin-clavulanic acid, which the patient took for two days before the lumbar puncture was performed on him. Areekul et al. reported a case of septicemia with meningitis secondary to *S. multivorum*, and the CSF findings in their case were similar to our case. However, our patient was immunocompetent healthy adult, whereas their patient had diabetes mellitus (3).

The *Sphingobacterium* species have shown a variable antimicrobial susceptibility pattern. In this reported case, the organism was susceptible to trimethoprim-sulfamethoxazole and ciprofloxacin but resistant to aminoglycosides, which is consistent with earlier reports (7, 11). However, the organism showed intermediate susceptibility to amoxicillin-clavulanic acid. *S. multivorum* can produce an extended β-lactamase and a metallo-β-lactamase, confirming its resistance to third-generation cephalosporins and carbapenems, respectively (1, 2). In our case, the organism was β-lactamase negative, so it was susceptible to ceftriaxone. Interestingly, one reported case showed that the organism was resistant to ampicillin in vitro, but the patient in this case responded very well to ampicillin and a single dose of tobramycin (4).

Previously reported cases of *S. multivorum* have involved both community and nosocomial acquisition and have involved infection in immunocompromised patients. In one reported case, *S. multivorum* was cultured from a patient with cystic fibrosis as a part of polymicrobial growth without affecting the clinical condition and FEV1 of the patient. This case raised the possibility that this organism is

a colonizer rather than an infecting agent (7). Our patient had a community-acquired infection, and the portal of entry was a skin injury that he had obtained two weeks earlier during an exercise.

In contrast to the earlier belief that infection due to *S. multivorum* occurs only in immunocompromised patients, we are reporting the first case of community-acquired *S. multivorum* bacteremia and meningitis in a healthy immunocompetent adult patient.

Footnote

Authors' Contribution: Study concept and design, Ali Hassan Abro; analysis and interpretation of data, Mohammad Reza Rahimi Shahmirzadi, Layal Mohammed Jasim, drafting of the manuscript, Layal Mohammed Jasim; critical revision of the manuscript for important intellectual content, Samar Badreddine, Zulfa Al Deesi.

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