CASE REPORT

Sphingobacterium spiritivorum septicaemia associated with cellulitis in a patient with Parkinson's disease

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SUMMARY

Sphingobacterium spiritivorum, a Gram-negative bacillus, is abundant in nature and is rarely involved in causing human infections. However, it is intrinsically resistant to many commonly administered antibiotics and can thus be a life-threatening microorganism. We describe a case of an 89-year-old Caucasian man who presented with sepsis from *S. spiritivorum* cellulitis.

BACKGROUND

Sphingobacterium spiritivorum is a Gram-negative, non-motile, non-spore-forming bacterium that is ubiquitous in nature and frequently isolated from soil, plant material and water bodies. It is rarely implicated in causing clinically significant human infections. We present a case of an 89-year-old Caucasian man who presented with foot cellulitis associated with *S. spiritivorum* septicaemia.

CASE PRESENTATION

An 89-year-old Caucasian man presented to the emergency department of our hospital after a fall in his nursing home 2 days prior. According to family members who accompanied him, the patient had been doing well until he became febrile, agitated and confused 1 day after his fall. He lived in an assisted-living nursing home and was mostly wheelchair user, but did a minimal amount of ambulatory transferring with the help of a walker. He had had multiple falls in the recent past. With this fall, he sustained skin tears on his right arm and right leg, and abrasions on his back. Though he developed a fever the day before his presentation, it was not documented at the nursing home. His medical history was significant for severe Parkinson's disease, hypertension, non-valvular atrial fibrillation, stage III chronic kidney disease and hypothyroidism. He had worked as a plumber but was now retired from that profession for many years. The patient was an ex-smoker who smoked two packs of cigarettes/day for 22 years and quit smoking at the age of 37 years. He denied alcohol or illicit drug use. His family history was positive for cancer in both parents and positive for Parkinson's disease in his mother, brother and sister. His current medications included carbidopa/levodopa, entacapone, pramipexole, aspirin, amiodarone, levothyroxine, midodrine, hydrocodone/acetaminophen, trazodone, polyethylene glycol and docusate sodium.

On physical examination, the patient was found to have a temperature of 101.3°F (38.5°C), tachypnoea with a respiratory rate of 24/min, elevated blood pressure of 151/110 mm Hg and oxygen saturation of 96% on 2 L/min by nasal cannula. An 8 cm long erythematous patch involving the right lower leg, ranging from the dorsum of the foot to the mid-tibia, was seen, which appeared suspicious for cellulitis. There were also superficial lacerations on his arm, leg and back, from his fall. The rest of the physical examination was unremarkable except for trace bilateral pitting pedal oedema. A portable A-P chest radiograph revealed mild cardiomegaly. A radiograph of the right leg obtained in the emergency department showed a non-displaced fracture of the distal right fibula. The patient was empirically initiated on piperacillin-tazobactam by the emergency room physician and was then admitted to the general medicine service for further care. Orthopaedic service was consulted and they recommended use of a walker boot for the non-displaced, non-operable distal fibular fracture. Venous Doppler ultrasound of bilateral lower extremities showed no evidence of venous thromboembolism.

INVESTIGATIONS

Blood analysis revealed an elevated white cell count (WCC; 16 400 cells/mm³) with 87% neutrophils, decreased haemoglobin (12.1 g/dL) and platelets (105 000/mm³). Urinalysis showed numerous red blood cells and WCC but was negative for nitrites and leucocyte esterase. Four blood cultures (two aerobic and two anaerobic) were obtained to investigate the cause of sepsis. Given the possibility of methicillin-resistant *Staphylococcal aureus* associated with cellulitis, vancomycin (1750 mg loading dose and 1250 mg every 18 h) was added to the piperacillin/tazobactam (3.375 g every 8 h) on hospital day 2.

Within 36 h of drawing blood cultures, two out of two aerobic blood culture bottles showed growth of Gram-negative bacilli in a BacT/ALERT system (BioMérieux, Marcy l'Etoile, France). Aliquot from positive culture was inoculated on blood agar, chocolate agar and MacConkey agar. Gram-negative colonies were seen on blood and chocolate agars but no growth was detected on MacConkey agar. Anaerobic blood cultures remained negative. The Gram-negative bacterium was identified as *S. spiritivorum*, using a Vitek 2 automated biochemical bacterial Identification System (BioMérieux, Marcy l'Etoile, France).

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Further susceptibility studies showed that this strain of *S. spiritivorum* was resistant to aztreonam, amikacin, gentamicin and tobramycin, and had intermediate susceptibility to ampicillin. Our isolated strain was sensitive to amoxicillin/clavulanic acid (minimum inhibitory concentration ≤ 2 mg/L), amoxicillin/sulbactam, cefazolin, cefoxitin, cefepime, cefpodoxime, ceftriaxone, cefuroxime, piperacillin, piperacillin/tazobactam, imipenem, levofloxacin, norfloxacin, ciprofloxacin, nalidixic acid, nitrofurantoin, tetracycline and trimethoprim-sulfamethoxazole.

TREATMENT

Once the blood culture results were available, the patient's intravenous vancomycin was discontinued. He remained afebrile and his leucocytosis resolved as he was treated with piperacillin-tazobactam. The patient was switched to oral amoxicillin-clavulanate 875 mg tablet three times a day for 10 days and was discharged to his nursing facility 3 days after the admission.

OUTCOME AND FOLLOW-UP

The patient was seen 3 weeks later in follow-up, his cellulitis had resolved and he was doing better.

DISCUSSION

S. spiritivorum (previously known as CDC group IIk, biotype 3) is an aerobic, non-motile, non-spore-forming, Gram-negative bacillus that was first described by Holmes *et al*¹ in 1982. Given the yellowish hue of their colonies on blood agar, several strains belonging to the genus *Sphingobacterium* were initially classified under genus *Flavobacterium*.² Yabuuchi *et al*³ proposed the new *Sphingobacterium* genus, which comprised of bacterial species containing high sphingophospholipid content in their cell membranes. Based on molecular and biochemical analysis, 15 species have been described in the genus *Sphingobacterium*.⁴ *S. multivorum* and *S. spiritivorum* cause the majority of human infections of clinical significance. Although all members are saccharolytic and acidify glucose, xylose and other sugars, the ability of *S. spiritivorum* to form acid from mannitol and ethylene glycol distinguishes it from other members of its genus. It produces catalase, oxidase and urease, but does not produce indole.⁴ *Sphingobacteria* are usually isolated from soil, plants and water sources, and their isolation from human specimens in the clinical context is very rare. The most common clinical isolates of *S. spiritivorum* have been from blood, urine and respiratory secretions.^{4 5} *S. spiritivorum* has been associated with causing respiratory tract infections in patients with cystic fibrosis,⁵ cellulitis and sepsis,⁶ bacteraemia⁷ and hypersensitivity pneumonitis (extrinsic allergic alveolitis).⁸ Most reported patients have had an immunocompromised state or multiple medical comorbidities.⁹

S. spiritivorum has varying degrees of resistance and susceptibility patterns to antibiotics. Per previous clinical reports, it is usually found to be resistant to aminoglycosides (eg, amikacin, gentamicin, tobramycin), aztreonam and polymyxins, and has been reported to be sensitive to β -lactams (penicillin derivatives, cephalosporins, carbapenems), fluoroquinolones, trimethoprim-sulfamethoxazole, tetracyclines and vancomycin, as in our case.^{4 6 10} Though, interestingly, several strains of *S. spiritivorum* described by Holmes *et al*¹ and Yabuuchi *et al*³ in 1982–1983, and recently by other authors, were resistant to penicillin derivatives, cephalosporins and tetracyclines as well as to aminoglycosides.^{5 9}

Our case describing *S. spiritivorum* septicaemia in an immunocompetent patient with severe Parkinson's disease adds to the growing body of evidence of rare but clinically significant infections caused by this bacterium, and emphasises the importance of obtaining blood cultures and identifying susceptibility patterns in patients presenting with severe cellulitis given the multidrug resistance pattern of this microorganism. Individualised treatment based on susceptibility results is essential given the variable drug resistance and sensitivity patterns (especially to β -lactams) shown by various strains of *S. spiritivorum*.

Learning points

- ▶ This case emphasises the importance of obtaining blood cultures in patients presenting with cellulitis
- ▶ *Sphingobacterium* species are highly resistant to commonly used antibiotics and so treatment should be based on susceptibility patterns given their variable resistance patterns to antibiotics (especially β -lactams).
- ▶ This case helps enhance awareness of readers on *Sphingobacterium spiritivorum*, a Gram-negative bacterium, as a rare cause of bacteraemia and cellulitis in adults.

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Competing interests None declared.

Patient consent Obtained.

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