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Bacteraemia by a unique non-fermenter; *Shewanella algae*

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Introduction

Shewanella species are Gram-negative pleomorphic bacilli that belong to environmental saprophytes and are considered emerging pathogens (1-3). *Shewanella algae and Shewanella putrefaciens* account for the majority of cases of human infections due to *Shewanella* species (1).

Infections are uncommon among healthy individuals but can be fulminant in immunocompromised hosts. Known risk factors and comorbidities predisposing to *Shewanella* infection are chronic leg ulcers, peripheral vascular disease, diabetes, chronic liver and kidney diseases, and seawater exposure (1). They commonly cause infections of the skin and soft tissues including cellulitis following chronic wounds or burns and there is a predilection to cause infections in tissues with poor circulation (1,4).

Here, we report a case of bacteraemia caused by *Shewanella algae.*

Case presentation

A 55-year-old male presented with swelling and pain in the left lower leg for three days. He had been on immunosuppressants for rheumatoid arthritis and suffered from chronic lymphoedema and chronic wounds of the left leg. On examination, he had hypotension and features suggestive of necrotizing fasciitis of the left lower limb. Therefore, a tentative diagnosis of necrotizing fasciitis complicated by sepsis was made. Hence, he was started on inotropes, intravenous (IV) meropenem 1 g 8 hourly, and oral clindamycin 450 mg 8 hourly. However, due to his clinical condition surgical debridement was postponed.

On admission, his white blood cell count was 12 x 10^3/mm^3 with neutrophil predominance (69%). His initial CRP was 344 mg/dL and ESR was 105 mm/1st hr.

His blood culture collected on admission grew an oxidase-positive non-fermenter (which did not ferment any sugars) with hydrogen sulfide (H_2S) production in the Kligler iron agar (KIA). There was a β-haemolysis in the blood agar plate with a brownish pigment and greenish discoloration of the surrounding media (Figure 1). Presumptive identification of *Shewanella* species was made with the above phenotypic characteristics. Growths were observed in salmonella-shigella agar (SS agar) and 6.5% NaCl which were performed to differentiate *Shewanella algae* from *Shewanella putrefaciens*. Identity was confirmed as *Shewanella algae* by the Vitek®-2 automated identification system. The isolate was sensitive to piperacillin-tazobactam, cephalosporins, aminoglycosides, quinolones, and carbapenems. The tissue samples that were taken at the surgical debridement performed on the 3rd day and one week after admission and the repeat blood culture did not yield the organism.

With the clinical improvement, IV meropenem and oral clindamycin were de-escalated to IV ceftriaxone 2g daily after 10 days of treatment. He responded clinically and biochemically to antibiotic treatment and surgical debridement. Thus, the antibiotic treatment was continued for 2 weeks before he was discharged. He was advised on the care of the lymphedematous limb on discharge and was planned to review in the surgical clinic if necessary.

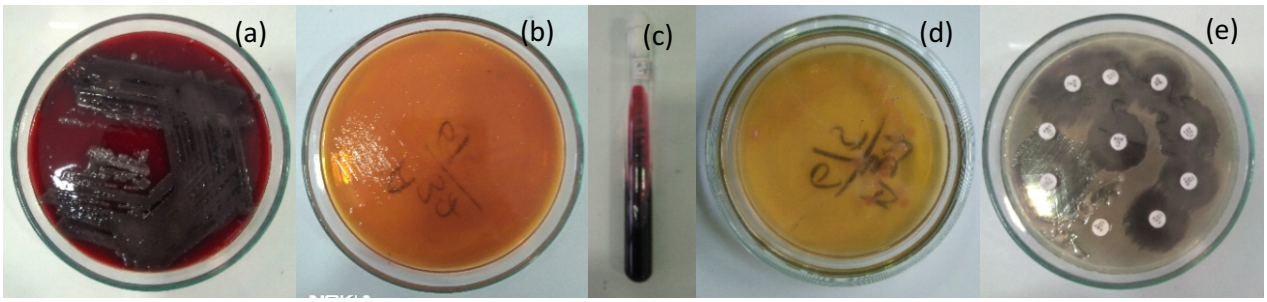

Figure 1: (a) Blood agar (b) MacConkey agar (c) KIA (d) SS agar (e) ABST

Discussion

Shewanella species commonly cause infections of the skin and soft tissues including cellulitis following chronic wounds or burns (1). Their predilection to cause infections in tissues with poor circulation is also evident in our case. Other reported clinical manifestations include bacteraemia, biliary infections, peritonitis, pneumonia, empyema, meningitis, brain abscess, osteomyelitis, otitis, urinary tract infection, and eye infections. Infections are common in warmer climates. Their pathogenesis is attributed to the presence of β-hemolysins, siderophores, iron chelating compounds, and biofilm production.

The unique feature of this non-fermenter is the production of H_2S in Kligler iron agar (KIA). Growth at 42°C, growth in salmonella-shigella agar (SS agar), growth in 6.5% NaCl, mucoid colonies, β-hemolysis on sheep blood agar, reduction of nitrite, and the inability to produce acid from sucrose, maltose, and L-arabinose are the biochemical features that differentiate *S. algae* from *S. putrefaciens.*

Shewanella species are usually susceptible to cephalosporins (third and fourth generations), piperacillin, aminoglycosides, and quinolones although resistance to cephalosporins, carbapenems, and quinolones have been reported (4).

The underlying immunosuppression and unhealthy skin would have predisposed to the infection in our patient (1). Although immunosuppression is known to cause fulminant sepsis by the organism and a poor outcome, prompt antibiotic therapy, and adequate surgical debridement lead to a favorable outcome in our patient. However, the failure to isolate the organism from the tissue cultures and the repeat blood culture may be attributed to the prior initiation of antibiotics.

If the isolate is not identified up to the species level, *Shewanella* can be easily misidentified as a *Pseudomonas* species due to its oxidase positivity. Nevertheless, unlike *Pseudomonas*, *Shewanella* can be treated with a wider range of antibiotics. Targeted antibiotics for the adequate duration with other supportive measures can save lives.

Informed written consent has been obtained from the patient to publish this case report.

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