

CASE REPORT

Soft Tissue Infection Caused by *Aeromonas hydrophila* along with *Staphylococcus aureus* in a Patient with Diabetes Mellitus

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Abstract:

Aeromonas species are Gram-negative bacilli usually isolated from gastrointestinal tract but occasionally cause skin and soft tissue infections. We report a case of soft tissue infection in a diabetic foot caused by *Aeromonas hydrophila* along with Methicillin Resistant *Staphylococcus aureus*. *Aeromonas* was identified to the species level by Vitek 2 Compact and other biochemical tests. The patient was initially treated empirically with parenteral amoxicillin-clavulanic acid along with wound debridement. Linezolid was added after the culture and antibiotic susceptibility report. Wound healed with this treatment regime along with regular saline dressing.

Keywords: *Aeromonas hydrophila*, Diabetes Mellitus, Diabetic Foot, Soft Tissue Infection

Introduction:

Genus *Aeromonas* is a member of the family Vibrionaceae. It is a Gram-negative halophilic bacillus found in aquatic environments [1]. *Aeromonas species* pathogenic to humans are *Aeromonas hydrophila*, *Aeromonas caviae* and *Aeromonas veronica biovar sobria* [2]. Major diseases caused by *Aeromonas species* are gastroenteritis and septicaemia [3]. Rarely, it causes extra-intestinal infections like Skin and Soft Tissue Infections (SSTI), peritonitis, cholangitis, osteomyelitis, ocular infections, urinary tract infection, pneumonia and meningitis

[2-3]. The infection is acquired either by ingestion of contaminated food or from environment following trauma or injury to the site resulting in exposure to aquatic environment [3]. Certain immuno-compromised conditions like diabetes mellitus and malignancy act as a predisposing factor in acquiring this infection [3]. We present one such case of co-infection of soft tissue by *Aeromonas hydrophila* and Methicillin Resistant *Staphylococcus aureus* (MRSA) in a patient with diabetes mellitus.

Case Report:

A sixty-six year old, male with diabetes mellitus, retired from work presented in monsoon season with medially projecting deformity of left foot since one month and swelling on medial side of the left foot overlying the deformity since three days. Swelling was initially small and later increased to present size. It was associated with pain. There was no history of fever, loose motions, other systemic complaints, past intervention, or surgery. There was no history of trauma to that foot or exposure to water. He is a known case of diabetes mellitus since eight years and is on antidiabetic drug. On examination, there was blister along with discharge overlying the swelling on medial aspect of left foot near medial malleolus with deformity of both feet.

Swelling was red, tense, tender, localised and warm. The posterior tibial artery and dorsalis pedis artery were palpable. Examination of both feet with 10 grams monofilament revealed bilateral neuropathy. X-ray of left foot was done which was suggestive of Charcot foot. Arterial colour doppler showed atherosclerotic changes in bilateral lower limb arteries with triphasic flow and heterogenous collection in soft tissue measuring 8×2.5 centimetres in the left foot. During wound debridement, it was found that there was infection leading to necrosis of involved skin and subcutaneous tissue but underlying tendons and muscles were healthy. His haematological investigations were within normal limits. Debrided tissue was sent for aerobic bacterial culture and antibiotic susceptibility testing. Gram stain of the tissue showed pus cells along with Gram-negative bacilli and Gram-positive cocci in clusters (Fig.1). It was inoculated on 5% Sheep Blood Agar (SBA) and MacConkey's Agar (MA) and incubated at 37°C for twenty-four hours. Two types of colonies were seen on SBA and single type on MA. On SBA, colony 1 was beta- haemolytic, grey, large, round, raised opaque (Fig.2) and colony 2 was smaller, beta-haemolytic, yellow, opaque, circular. Colony on MA was colourless, large, flat, circular and shiny. Gram stain showed that colony one of SBA and colony on MA were Gram-negative bacilli. Both were oxidase positive. Colony 2 of SBA were Gram-positive cocci in clusters. All three types of colonies were identified and antibiotic susceptibility testing done by Vitek 2 Compact automated system. GPID and 628 card

and GNID and 281 card were used for Gram-positive and Gram-negative colonies respectively. Gram-positive growth was identified as Methicillin resistant *Staphylococcus aureus* (MRSA) and Gram-negative growths from SBA and MA were identified as *Aeromonas hydrophila/caviae*. Manual biochemicals for Gram-negative colonies showed positive reaction in indole, citrate and Voges-Proskauer test. Triple sugar iron agar showed acid butt and acid slant and esculin was hydrolysed. So on the basis of biochemical tests, positive reaction in oxidase and beta-haemolysis, it was confirmed to be *Aeromonas hydrophila* [1]. It was susceptible to cefuroxime, cefepime, ceftazidime, amikacin, gentamicin, cefoperazone-sulbactam, ciprofloxacin, trimethoprim-sulfamethoxazole. It showed resistance to ampicillin, cefotaxime, ceftriaxone, piperacillin-tazobactam, and intermediate susceptibility to amoxicillin-clavulanic acid. MRSA was susceptible to vancomycin, teicoplanin, linezolid, clindamycin, ciprofloxacin and gentamicin. The patient was empirically given intravenous amoxicillin-clavulanic acid 1.2 grams twelve hourly for five days. After culture report, oral linezolid was added to his treatment regime in a dose of 600 mg twice a day five days. A total contact cast was given for Charcot foot with a window over the wound and alternate day saline dressing carried out. He was discharged on tenth day. He came after two weeks for follow-up. The wound was healing with healthy granulation tissue. Culture of the debrided tissue sample from that site on follow-up did not show growth of *Aeromonas hydrophila*.

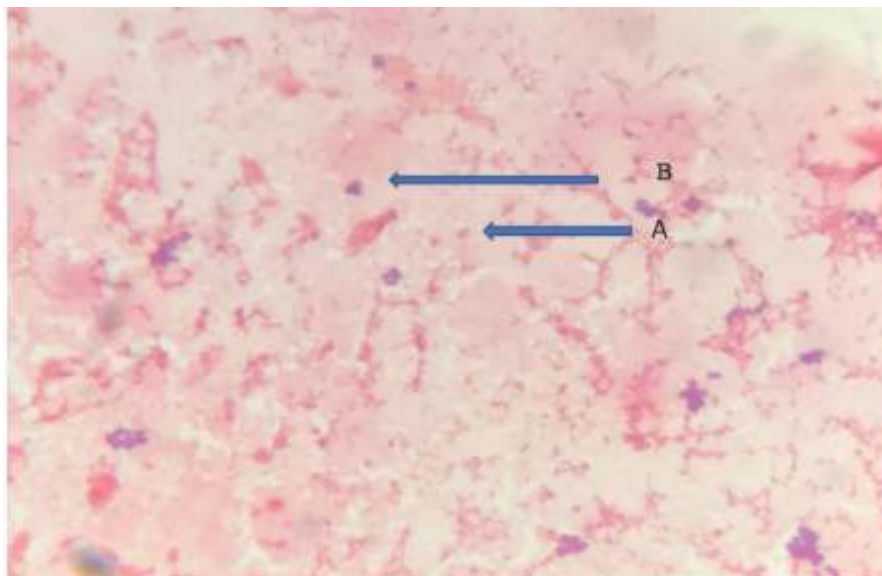


Fig. 1: Gram Stain of Tissue showing Gram-Negative Bacilli (A) and Gram-Positive Cocci in Clusters (B)

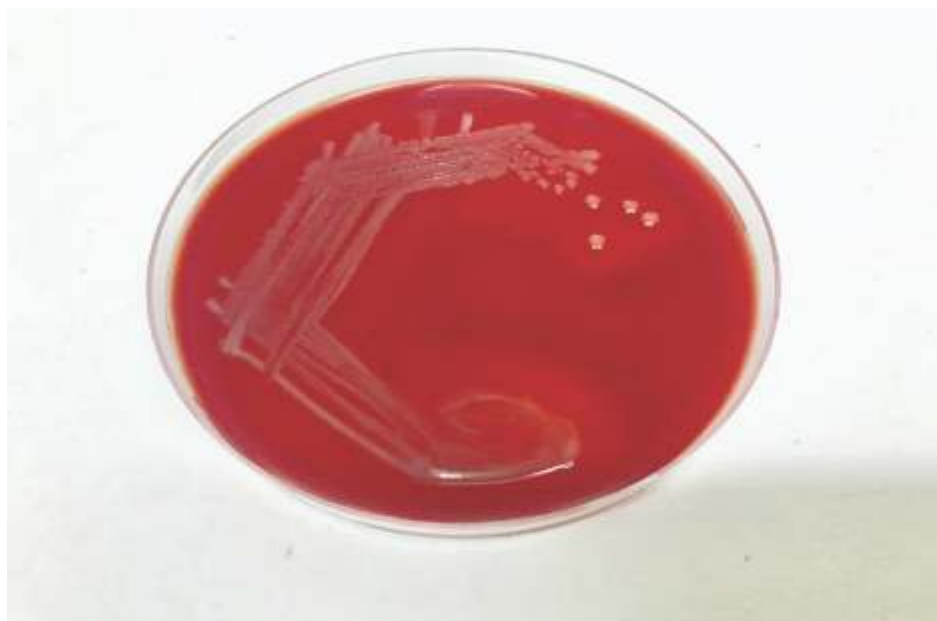


Fig. 2: Colonies of *Aeromonas hydrophila* showing Beta Haemolysis on Sheep Blood Agar

Discussion:

Extra-intestinal infections like skin and soft tissue infections caused by *Aeromonas species* are rare [1]. *Aeromonas species* inhabit fresh and brackish waters and are known to be associated with diarrheal diseases [4]. The commonest isolated species from humans is *Aeromonas hydrophila*. Soft tissue infections caused by *Aeromonas hydrophila* are acquired after exposure to contaminated water or objects following trauma to soft tissue [5]. Extra-intestinal infections by *Aeromonas species* can occur in immunocompromised as well immunocompetent host [4]. Some risk factors that predispose to *Aeromonas* infection are immunosuppression, diabetes, malignancy and surgical intervention [2]. Soft tissue infections as cellulitis or necrotising fasciitis by this organism are more commonly seen in patients with diabetes mellitus [6-7]. Banerjee *et al.* observed that the commonest site of SSTI by this organism was lower extremities [4] as was seen in our case. Our patient did not give history of obvious trauma or exposure to water. But he presented at the peak of heavy rains and he had a deformed foot with peripheral neuropathy. So, even a trauma to the foot caused by footwear or some other minor trauma may have gone unnoticed. Our patient's diabetic status could be a predisposing factor for development of infection. In our case, MRSA also grew along with *A. hydrophila*. Polymicrobial infection was found in more than half the number of cases of SSTI with *Aeromonas* in a study by Banerjee *et al.* [4, 7]. Other organisms that were found along with *Aeromonas species* were *S. aureus*, *Citrobacter species* and *P. aeruginosa* from such infections [4] similar to our case. Occasionally, SSTI can

progress to more severe form like gangrene or myonecrosis of the soft tissue or invade the blood stream in patients with underlying co-morbid conditions [4, 6]. Our patient had long standing diabetes mellitus with fluid collection and necrosis in the soft tissue of lower left foot which could have progressed due to his co-morbid condition. Hence, the above facts along with Gram stain of the sample showing Gram-negative and Gram-positive organisms were indicative that *Aeromonas* was also one of the pathogenic organism involved in this case. The *Aeromonas* isolate showed intermediate susceptibility to amoxicillin-clavulanic acid and hence the empirical treatment with this drug might have handled this isolate. Later, oral linezolid was added for the MRSA isolate. These antibiotics along with debridement of dead tissue and regular dressing led to wound healing. Our isolate of *Aeromonas* was resistant to ceftriaxone and piperacillin-tazobactam but susceptible to fluoroquinolones. According to Rutteman *et al.*, *Aeromonas* strains are susceptible to fluoroquinolones but resistant to other antibiotics [8]. Beta-lactamase production causes resistance to ampicillin and first generations cephalosporins among *Aeromonas* [9]. Banerjee *et al.* observed resistance to ceftriaxone and piperacillin-tazobactam among their *Aeromonas* isolates similar to ours [4].

Conclusion:

From this case, we comprehend that though there was no history of obvious trauma in a diabetic foot, finding of Gram stain confirmed by culture report and supported by clinical correlation strongly propose this organism to be a pathogen.

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