CASE REPORT

Necrotizing fasciitis caused by *Aeromonas caviae*

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ABSTRACT

Aeromonads are rarely associated with human intestinal and extra-intestinal diseases and syndromes, ranging from relatively mild illnesses such as acute gastroenteritis to life-threatening conditions, including septicemia, necrotizing fasciitis, and myonecrosis. Among the aeromonas species known to cause human infection, *Aeromonas caviae* has been associated with septicemia and only one reported case of human soft tissue infection. Most of the infections due to aeromonas occur in immunocompromised patients. Herein we describe a successfully treated case of post-traumatic skin and soft-tissue infections due to *A. caviae* in an otherwise immunocompetent individual.

Key words: *Aeromonas caviae*, soft tissue infection, necrotizing fascitis

INTRODUCTION

The genus *Aeromonas* is a member of the family Aeromonadaceae. *Aeromonas hydrophila* is the most commonly isolated species associated with human infections.[1] Human infections caused by the *Aeromonas* species are rare and include gastrointestinal illness, soft tissue infections, pneumonia, meningitis, endocarditis, osteomyelitis, and septic arthritis.[1] Skin and soft-tissue and infections are second in prevalence only to gastrointestinal illnesses.[1] *Aeromonas* wound infections typically occur within 72 h after injury and are characterized by pain, swelling, hemorrhagic bullae, subcutaneous bleeding, purpura, necrosis, and gangrene, which can be severe, with myonecrosis and gas production resembling those caused by Clostridia.[2] The fatality rate of Aeromonas soft-tissue infections and bacteremia is high and reportedly ranges from as much as 28-73%.[2,3] The only other reported case of *Aeromonas caviae* causing soft-tissue infection was in a patient undergoing liposuction in which diagnosis of necrotizing fasciitis was delayed, leading to multi-organ dysfunction and skin necrosis with consequent massive skin loss. Thus, early diagnosis and prompt aggressive debridement are essential and critical for survival.[4]

Herein we describe a successfully treated case of post-traumatic skin and soft-tissue infections due to *A. caviae* in an otherwise immunocompetent individual.

CASE REPORT

A 71-year-old male patient presented with a wound over the right foot discharging pus, along with fever and subcutaneous swelling of the lower right extremity extending up to the knee joint. The patient gave a history of trauma due to foreign body to the foot 10 days back, following which bullous lesions developed over the lower leg, associated with insidious swelling of the lower leg. The patient also gave a history of self manipulation of the bulla, in order to drain the pus, which led to active pus discharge from the wound, fever and rapid extension of the soft-tissue swelling. The patient was seen by a general practitioner, who prescribed the patient oral amoxicillin + clavulanic acid, but despite the therapy the patient's condition deteriorated and the patient then presented to our hospital. The patient's past medical history revealed that he was on medications for hypertension and had undergone a coronary artery bypass graft (CABG) four years back.

The On general examination of the patient was conscious, alert and cooperative, with a heart rate of 80/min, blood pressure 130/70 mm Hg, and all his peripheral pulses

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were palpable. Extensive necrosis of the underlying skin and muscle of the right lower extremity was noted. His laboratory investigations were: urea 37 mg/dl; creatinine 0.9 mg/dl; total protein 5.2 mg/dl; bilirubin 1.5 mg/dl, fasting blood sugar 93 mg/dl; post-prandial blood sugar 136 mg/dl. The leukocyte count was 3800 cells/mm^3 with 41% segmented neutrophils, 33% metamyelocytes, 1% myelocytes, 4% monocytes, 4% lymphocytes, and 17% band neutrophils. HIV test was negative.

A diagnosis of necrotizing fasciitis was made and the patient underwent extensive fasciotomy and debridement along with removal of the necrotic skin. Extensive necrosis of the underlying skin and muscle also was noted. The drained pus was sent for culture and the patient was started on intravenous ceftriaxone and amikacin. The Gram stain of the pus showed pus cells with plenty of Gram-negative bacilli. The culture on MacConkey's agar showed non-lactose fermenting colonies, which were oxidase-positive. The organism exhibited the "suicidal phenomenon", was anaerogenic and esculin-positive and was identified to be *Aeromonas caviae* by standard laboratory techniques.[5] The isolate was sensitive to amoxycillin-clavuanic acid, cefazolin, cefotaxime, gentamicin, tetracycline, ciprofloxacin and cotrimoxazole and was resistant to ampicillin and piperacillin. The isolate was tested for production of extended-spectrum β lactamase (ESBL) and carbapenemase as per the Clinical Laboratory Standards Institute (CLSI) guidelines, but the tests were negative.[6]

Meanwhile the patient responded well, with subsidence of the fever and his blood counts returning to normal levels. Daily dressing of the wound was applied. The subsequent wound swab cultures taken after seven days were negative. The patient was taken up for split-skin grafting of the bare area of the right leg after 10 days. He was discharged with satisfactory graft uptake after one week without any further antibiotics advice.

DISCUSSION

Aeromonas species, members of the Aeromonadaceae family, are Gram-negative bacteria that exhibit positive oxidase activity and glucose fermentation.[1] The aeromonads are distributed worldwide and proliferate mainly in fresh water, sewage, and soils. *Aeromonas hydrophila*, *Aeromonas sobria*, and *Aeromonas caviae* are frequently reported in association with human diseases, especially in patients with chronic illnesses such as liver cirrhosis, alcoholic liver disease, malignancies, gouty arthritis, chronic renal failure, diabetes mellitus, or chronic steroid use. *Aeromonas* species can produce many virulence factors, including hemolysin, cytotoxin, aerolysin, enterotoxin, endotoxin, protease, adhesins, leukocidin, and lipases. Dwivedi *et al*., have demonstrated a high degree of invasiveness of *A. caviae* by their experiments on Hep-2 cells.[1,2,7]

The second most common anatomic site from which aeromonads have been recovered is the integument and deeper soft tissues underlying the epidermis. *Aeromonas* species can be associated with a variety of skin and soft-tissue infections (SSTIs), ranging from mild topical problems such as pustular lesions to serious or life-threatening infections. The latter manifestations can range from infections of subcutaneous tissues (cellulitis) to processes involving the deeper layers of the skin and subcutaneous tissues while spreading along fascial planes (necrotizing fasciitis) with the potential to cause severe damage to muscle tissue (myonecrosis). Necrotizing fasciitis or myonecrosis is most often seen in persons with liver disease or malignancy[1] but our patient had no such associated condition. Such devastating disease can be associated with high mortality rates approaching 60-75%. The greater the initial insult, the more likely it is that serious life-threatening *Aeromonas* disease will result from infection.[1]

The rapid onset of cellulitis in the setting of soft-tissue trauma within 72 h after injury characterized by pain, swelling, hemorrhagic bullae, subcutaneous bleeding, purpura, necrosis, and gangrene, resembling that caused by Clostridia[2] should alert the clinician regarding the possibility of infection with this organism.[4] Early diagnosis and prompt aggressive debridement are essential and critical in order to decrease the morbidity and mortality associated with soft-tissue infections caused by this organism as was concluded from the only other reported case of soft-tissue infection by *A. caviae*.[4,8]

After surgical decompression, parenteral and oral antibiotics is an essential part of the treatment. While clinical isolates of Aeromonas are susceptible to a wide range of antibiotics, they are universally resistant to penicillin, ampicillin, carbenicillin, and cefazolin.[1] The reports of the emergence of resistance to antibiotics due to the expression of Class B, C and D β lactamase among aeromonads, and cases of IMP metallo β lactamase being reported in *A. caviae* is also alarming.[1,8] Therefore, appropriate antimicrobial therapy, as determined by a culture and sensitivity report, is of paramount importance in addition to early surgical exploration of wounds, for optimal management of these rare, yet rapidly progressive infections.

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