Case report

* Aeromonas veronii* cellulitis, bacteremia, and sepsis in a patient with liver cirrhosis and end-stage renal disease following a minor abrasion with exposure to pond water: A case report and literature review

Charlotte L. Stanbaugh, Elfatih I. Abter, Amorena L. Tompkins

Keywords: Aeromonas Cellulitis Bacteremia Pond water Cirrhosis End-stage-renal-disease

Abstract

*Aeromonas* are a well-known cause of gastrointestinal illness in humans; however, extra-intestinal infections due to *Aeromonas* spp. have been increasingly reported. Severe infection and septic shock due to *Aeromonas* spp. is rare, though the risk is greater for immunocompromised individuals. Patients with liver cirrhosis have been noted to be at especially high risk for severe infection due to *Aeromonas* spp. Several cases of septicemia due to *Aeromonas* spp. have been reported in the literature. We report a rare case of *A. veronii* septicemia in a patient with known liver cirrhosis and end-stage renal disease following a minor abrasion with exposure to pond water. The patient’s history fostered clinical suspicion of *Aeromonas* infection and tailored early diagnosis and treatment.

Introduction

Cirrhosis of the liver is considered one of the most common forms of acquired immunodeficiency and greatly increases the risk of bacterial infection. Cirrhotic patients have low albumin levels and higher rates of gastrointestinal bleeding, which have been identified as two main independent risk factors for infection. Up to 25 % of deaths in cirrhotic patients are estimated to be due to bacterial infection [1]. Likewise, end-stage renal disease and hemodialysis is associated with immune dysfunction, resulting in increased risk of infection and accounting for 20 % of deaths in this population [2].

*Aeromonas* spp. are gram-negative, rod-shaped bacteria widely prevalent in aquatic environments. These bacteria cause disease in both warm and cold-blooded animals. In humans, they are commonly associated with gastrointestinal illness; however, they have also been identified as a causative agent of cellulitis and soft-tissue infections as well as septicemia in both immunocompetent and immunocompromised hosts [3–5]. Septicemia due to *Aeromonas* spp. is relatively uncommon, occurring in only about 3 % of individuals infected with the bacteria in one study, and this most commonly happens when infections are caused by *A. hydrophila* as opposed to other aeromonads [4,6,7].

Immunocompromised individuals, such as the cirrhotic patient, have a much greater risk of severe infection with *Aeromonas* spp. and *Aeromonas* septicemia [1,7]. One study found that 98 % of the observed patients with *Aeromonas* septicemia were immunocompromised [4]. Furthermore, fatality rates for *Aeromonas* septicemia have been reported to be as high as 50 % in some studies [4]. Early clinical recognition of infection due to *Aeromonas* spp. is imperative for administering appropriate antibiotic therapy and avoiding adverse clinical outcomes in patients with severe disease. We describe a case of severe skin and soft-tissue infection, bacteremia, and subsequent septic shock due to *Aeromonas veronii*. The patient was immunocompromised with liver cirrhosis and end-stage renal disease. A successful clinical outcome was achieved because of early clinical suspicion and appropriate antibiotic therapy early in the treatment course.

Case presentation

The patient, a 64-year-old white female with a past medical history of Hepatitis C-induced liver cirrhosis, end-stage renal disease on hemodialysis, chronic anemia, and hypothyroidism, was admitted to the emergency department with fatigue, weakness, blurry vision, and shortness of breath. The patient stated that three days prior, she had been outside fishing in a pond in Michigan. The patient reportedly fell...
and received an abrasion on her left forearm. She was doing well, however, until the day of admission. That day, she woke up feeling fatigued with blurry vision, weakness, and shortness of breath and was unable to go to hemodialysis. The patient also noted that she began developing blisters on her left forearm that appeared to be filled with blood. On arrival to the ED, her vital signs were blood pressure 60/26 mmHg, pulse rate 88/min, respiration rate 17/min, and T. 94.0 °F (34.4 °C). On physical examination, the patient was noted to have hyperpigmentation, edema, and hemorrhagic bullae on her left forearm (Fig. 1). She was also noted to have diminished breath sounds at the lung bases with bibasilar crackles on lung auscultation.

Her white blood cell count was 19,550 (X10 * 3/ul), and her lactic acid was 10.7 mmol/L. A chest CT scan showed bibasilar atelectasis and consolidation consistent with pneumonia. An abdominal CT scan noted hepatosplenomegaly changes consistent with cirrhosis and portal venous hypertension as well as ascites of moderate volume.

The patient was diagnosed with septic shock with a likely source of either cellulitis or pneumonia. The patient was placed on pressors and admitted to the intensive care unit. Infectious disease consultations were requested for septic shock and pneumonia. Aeromonas infection was suspected, and an I.V. of gentamicin and Levaquin was added to the initial empiric regimen of vancomycin and Zosyn. Orthopedic surgery was consulted and blisters were aspirated, but no excisional debridement was done because non-contrast C revealed no subcutaneous emphysema and no collection.

On the second day of admission, the patient’s white blood cell count began a downward trend (12,350 × 10^3/ul). Blood cultures were released on the third day of admission, which revealed Aeromonas veronii complex (MicroScan WalkAway, Siemens). The isolate resisted the antibiotics ampicillin-sulbactam and piperacillin-tazobactam (Table 1). Antibiotics were later narrowed down to post-dialysis ceftazidime and gentamicin. The patient also received an additional post-dialysis dose of vancomycin. The patient remained stable and was discharged on day 10.

**Discussion**

Aeromonas spp. can cause soft-tissue infections, which are often associated with environmental exposure to water, such as in the case of this patient who was fishing at the time of exposure. Patients with liver cirrhosis have an increased risk of bacteremia and sepsis due to Aeromonas spp. [7]. Because bacterial infections are a significant cause of death in patients with liver cirrhosis, it is important to be aware of the pathogens that pose a particular risk to these patients. Aeromonas spp. should be considered one of these pathogens in septic patients with underlying liver cirrhosis and a history of infection or injury related to pond or lake water exposure. On the other hand, in patients with end-stage renal disease on dialysis, we found reports in the literature of Aeromonas spp mainly causing catheter-related infection [8,9] along with fatal bacteremia in a patient receiving deferoxamine [10].

Empiric antibiotic therapy should be promptly administered in patients displaying signs of sepsis, especially in patients who are immunocompromised. Aeromonas spp. produce a beta-lactamase and generally show resistance to penicillin, ampicillin, amoxicillin or clavulanate, and first and second-generation cephalosporins [4,9]. Cirrhotic patients presenting with water-related skin infections and sepsis should receive empiric antibiotic therapy with adequate coverage for Aeromonas spp. Knowledge of resistance profiles for Aeromonas spp. is important when treating these patients. Third-generation cephalosporins, fluoroquinolones, and trimethoprim-sulfamethoxazole have been shown to be the most effective and should thus be considered when choosing empiric antibiotic therapy [4,9].

Gathering a detailed history upon patient arrival to the hospital allows for consideration of a larger pool of pathogens that may not be initially considered when starting empiric antibiotic therapy. Presence of injury in freshwater aquatic environments should elicit high clinical suspicion for Aeromonas infection, such as in our patient. Blood cultures are required because these patients are at greater risk for bacteremia and more severe illness.

**Conclusion**

Thorough history-taking is important in all medical fields. For immunocompromised patients at increased risk for infection at baseline, taking a detailed history is especially important to expand clinical suspicion of possible diagnoses. This can lead to early treatment and a significantly reduced rate of morbidity and mortality in these patients.

**Ethical approval**

No study on patient or volunteers

---

**Table 1**  
Aeromonas veronii isolate susceptibility.

| Antibiotic | MIC (mcg/ml) |
|------------|-------------|
| Amikacin   | < 16        |
| Amoxicillin/Clavulanic acid | 16/8 |
| Amoxicillin  | > 16/8      |
| Aztreonam  | < 4         |
| Cefazolin  | 4          |
| Cefepime   | > 2         |
| Cefotaxime | < 2         |
| Cefoxitin  | < 8         |
| Ceftriaxone| < 1         |
| Cefuroxime | < 4         |
| Ciprofloxacin | < 1 |
| Gentamicin | < 2         |
| Levofoxacin| < 2         |
| Meropenem  | < 1         |
| Piperacillin-tazobactam | > 64 |
| Tetracycline| < 4       |
| Tigecycline| < 1         |
| Trimethoprim/sulfamethoxazole | < 2/38 |

S: Sensitive, I: Intermediate, R: resistant
Consent

Consent on file

Author contribution

Charlotte Stanbrough, medical student. First author, wrote the manuscript. Elfath Abter, corresponding author, mentored, recommended publication of the case report, designed manuscript and revised, updated the findings and updated the references. Also submitted. Amorena Tompkins, data collection.

Conflict of interest

No conflict of interest

References

[1] Brann OS. Infectious complications of cirrhosis. Curr Gastroenterol Rep 2001;3: 285-292.

[2] Kato S, Chmielewski M, Honda H, et al. Aspects of immune dysfunction in end-stage renal disease. Clin J Am Soc Nephrol 2008;3(5):1526-33.

[3] Igbinosa IH, Igumbor EU, Aghada N, et al. Emerging Aeromonas species infections and their significance in public health. Sci World J 2012.

[4] Janda JM, Guthertz LS, Kokka RP. Aeromonas species in septicemia: laboratory characteristics and clinical observations. Clin Infect Dis 1994;19:77-83.

[5] Bhownick UD, Bhattarajee S. Bacteriological, clinical and virulence aspects of aeromonas-associated diseases in humans. Pol J Microbiol 2018;67(2):137-49.

[6] Chao C.M., Lai C.C., Tang H.J., et al. Skin and soft-tissue infections caused by Aeromonas species. 2013, 32: 543-547.

[7] Finkelstein R., Oren I. Soft Tissue Infections Caused by Marine Bacterial Pathogens: Epidemiology, Diagnosis, and Management. 2011, 13: 470-477.

[8] Zhou Z, Guo D. Catheter-related bacteremia caused by Aeromonas hydrophila in a hemodialysis patient. Infect Control Hosp Epidemiol 2013;34(7):765-6.

[9] Khalil MA, Rehman A, Kashif WU, Rangasami M, Tan J. A rare case of Aeromonas hydrophila catheter related sepsis in a patient with chronic kidney disease receiving steroids and dialysis: a case report and review of Aeromonas infections in chronic kidney disease patients. Case Rep Nephrol 2013;2013:735194.

[10] Lin Shih-Hua, Shieh Shang-Der, Yuh-Feng Lin E, et al. Fatal Aeromonas hydrophila bacteremia in a hemodialysis patient treated with deferoxamine. Am J Kidney Dis 1996;27(5):733-5.