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Chronic osteomyelitis by *Aeromonas hydrophila*: A silent cause of concern

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Abstract:

Aeromonas is a Gram-negative bacillus, widely found in aquatic environment. Osteoarticular pathology caused by *Aeromonas hydrophila* is rarely encountered. To the best of our knowledge, this is the first case of chronic osteomyelitis by *A. hydrophila* reported from India. We report a case of chronic osteomyelitis of the lower limb due to *A. hydrophila*, which occurred as a delayed complication following open reduction and internal fixation. Prompt medical and surgical intervention supplemented by a comprehensive microbiological workup aided in pathogen identification and specific antimicrobial administration resulting in the successful outcome of our patient. This case illustrates the utility of multidisciplinary management approach involving microbiologists and orthopedicians in investigating and appropriately managing such cases.

Key words:

Aeromonas hydrophila, chronic osteomyelitis, delayed infection, occupational injury

Introduction

Aeromonas is a Gram-negative bacilli, member of family *Aeromonadaceae*, widely found in aquatic environment. The most common *Aeromonas* species associated with human infections are *Aeromonas hydrophila*, *Aeromonas caviae*, and *Aeromonas veronii* biovar *sobria*.^[1] This organism mainly causes gastrointestinal infections. Although rare, extra-intestinal *Aeromonas* infections (skin and soft tissue infections, pneumonia, endocarditis, and meningitis) have also been reported.^[2-4] This is a case of chronic osteomyelitis of the lower limb due to *A. hydrophila*, which occurred as a delayed complication following open reduction and internal fixation.

Case Report

A 50-year-old diabetic male, steel plant laborer by occupation, presented to the orthopedics outpatient department of our hospital with a history of pain and purulent discharge from the lower one-third of

the right leg of 6 months' duration. The patient had a history of fracture of his right lower limb following an occupational injury by an iron rod, 5 years ago. Open reduction and internal fixation was done at a private hospital. A dynamic compression plate was placed *in situ* at the right distal tibia and fibula. Postoperative stay was uneventful, and the patient was discharged in a satisfactory condition. However, 6 months postoperative, he revisited the same hospital with complaints of pain and purulent discharge from the surgical site. He received empirical treatment with oral amoxicillin-clavulanic acid 625 mg 8 hourly for 6 weeks, but discharge from the wound persisted. He was then reoperated to remove the dynamic compression plate. Following removal of the implant, the patient was treated empirically with oral amoxicillin-clavulanic acid 625 mg 8 hourly for 6 weeks. Postoperatively, the wound discharge persisted for which he received intermittent antibiotics from a local practitioner, details of which were undocumented. Local examination at our institution revealed an ulcer of 3 cm × 5 cm

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size over the anteromedial aspect of the right lower limb with discharging sinuses. There was no documented fever, and systemic examination was unremarkable. No other focus of infection could be identified.

Laboratory data revealed a total leukocyte count of $14,300/\text{mm}^3$, with 70% polymorphonuclear leukocytes, erythrocyte sedimentation rate of 48 mm/h, and a blood sugar level of fasting – 164 mg/dl and postprandial – 314 mg/dl. Digital X-ray of the right lower limb showed irregularity of lower one-third of tibia and fibula with irregular periosteal reaction and presence of multiple sinuses [Figure 1]. A pus sample was collected and sent for microbiological investigation. Gram stain of pus showed numerous polymorphonuclear leukocytes and Gram-negative bacilli. Pus culture grew β -hemolytic colonies on 5% sheep blood agar and nonlactose-fermenting colonies on MacConkey agar which were identified as *A. hydrophila* by matrix-assisted laser desorption ionization-time of flight mass spectrometry using the bioMérieux VITEK MS system (IVD database version 2.0) (USA). The isolate was susceptible to amikacin, cefotaxime, ciprofloxacin, imipenem, meropenem, cefoperazone-sulbactam, and piperacillin-tazobactam but resistant to amoxicillin-clavulanic acid. Then, the patient underwent surgical removal of affected bony and soft tissue segment. Bone and tissue were sent for bacterial culture. Culture of both the samples yielded pure growth of *A. hydrophila* with similar antibiogram. Following culture antibiogram oral Ciprofloxacin (500 mg 12 hourly) was added and continued for 6 weeks. On follow-up, the wound was completely dry and the patient had an uneventful recovery.

Discussion

Osteomyelitis can occur by hematogenous spread or contiguous spread or by secondary infection.^[5] Due to



Figure 1: Anteroposterior and lateral radiograph of the right tibia and fibula showing periosteal reactions and cortical destruction

the use of broad-spectrum antibiotics, the prevalence of osteomyelitis is decreasing, but in developing countries, it is still a significant and challenging issue. Clinically, it is difficult to distinguish chronic osteomyelitis from acute osteomyelitis, but the presence of chronic discharging sinus suggests a long-standing pathology, as was observed in this case.

The most common causative agents responsible for osteomyelitis are *Staphylococcus aureus* followed by Streptococci and Gram-negative bacilli. Osteoarticular pathology caused by *A. hydrophila* is rarely encountered.^[1,6,7] To the best of our knowledge, this is the first case of chronic osteomyelitis by *A. hydrophila* reported from India.

Immunosuppression, diabetes, malignancy, direct exposure to freshwater lakes, local trauma, and surgical interventions are predisposing risk factors for *Aeromonas* infection. Diabetes, local trauma, and presence of implant in our patient predisposed him to develop chronic osteomyelitis.

Chronic osteomyelitis is a serious condition and requires both medical and surgical treatment.

Selection of appropriate antibiotics requires the antimicrobial susceptibility profile of the bacteria involved in these infections. *Aeromonas* is susceptible to a wide range of antibiotics, yet resistance to ampicillin and first-generation cephalosporins has been reported. The recommended empirical treatment for osteomyelitis does not provide adequate coverage against *Aeromonas* infection which is a matter of concern.^[3] Our patient too received inappropriate antimicrobial therapy which contributed to the chronic course of the infection. In addition to surgical interventions, the use of appropriate antimicrobial agents effective against these uncommon etiological agents of osteomyelitis is of paramount importance for the optimal management and to prevent further complications.

This case illustrates the ability of an opportunistic pathogen to cause osteomyelitis. Considering the increasing usage of implants and automated diagnostic systems, one can expect the incidence of *Aeromonas*-associated infections to increase as well. Several lines of evidence suggest that *A. hydrophila* isolated from this patient was pathogenic and was responsible for osteomyelitis. definite evidence of infection was present, there was an absence of other pathogens and the infection responded to treatment. Prompt medical and surgical intervention supplemented by a comprehensive microbiological workup aided in pathogen identification and specific antimicrobial administration resulting in the successful outcome of our patient.

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Conflicts of interest

There are no conflicts of interest.

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