

Rare Infection with *Raoultella ornithinolytica* in a case of Foot trauma: A Case Report.

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Abstract: Foot traumas are prone to infections due to wound contamination.¹ We present a rare case of *Raoultella ornithinolytica* infection following a road traffic accident. A 30-year-old gentleman sustained a right foot injury with an open wound. He was initially given wound care and empirical antibiotics. However, persistent wound infection necessitated surgical exploration, which showed retained rubber fragments. Microbiological analysis identified *Raoultella ornithinolytica*, an environmental Gram-negative bacillus, as the causative agent. Two pus samples from different sites grew the same organism, confirming the diagnosis. A third sample, collected postoperatively from a discharging wound, also grew *Raoultella ornithinolytica* with a similar sensitivity pattern, reconfirming the pathogen. Following the sensitivity pattern, the patient showed significant improvement upon shifting to Ciprofloxacin with Metronidazole. The postoperative course was uneventful with complete recovery of the patient. This case highlights the importance of thorough wound exploration, microbiological diagnosis and targeted antibiotic therapy in managing post-traumatic wound infections.

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I. Introduction:

Trauma-related infections are often caused by bacteria from environmental sources.¹ While *Raoultella ornithinolytica* is primarily an environmental bacterium, it has recently emerged as a pathogen, both in immunocompromised and immunocompetent patients.² The organism belongs to the Enterobacteriaceae family and has been linked to various infections, including pneumonia, urinary tract infections, and rare cases of soft tissue infections.³ Given the scarcity of literature on *Raoultella ornithinolytica* in traumatic wound infections, this report aims to contribute to the growing awareness of its clinical significance.

Case Report: A 30-year-old male presented to the casualty department with right foot trauma following a road traffic accident. On examination, he had a contused and lacerated wound (CLW) on the right sole measuring 7 cm × 0.5 cm × 1 cm and two punched-out wounds (1 cm each) on the sole and dorsolateral aspect. Additionally, an X-ray of the foot revealed a fracture of the fifth metatarsal bone, which was managed conservatively. Initial management included wound cleansing, suturing under local anesthesia and initiation of Amoxicillin – Clavulanic acid 625 mg twice daily. The patient was called for follow up in five days.

On Day 5, the patient returned with complaints of pus discharge from the wound. Upon evaluation, a pus collection was suspected and the patient was admitted for further management. Pre-anesthesia fitness was obtained, during which patient was found to be seronegative. The patient was operated for wound exploration and incision drainage. During the procedure, three fragments of retained rubber footwear fragments were discovered within the pus-filled cavity, measuring 3 × 2 cm, 2 × 1 cm and 1.5 × 2 cm respectively. Two pus samples were collected from different wound sites and sent for microbiological analysis.

Methods and Microbiological Findings: • Gram Stain: Revealed plump stout Gram-negative bacilli. • Culture: Showed 18 -20 pure mucoid colonies on Blood Agar and MacConkey Agar. • Identification: *Raoultella ornithinolytica* was confirmed using Vitek MS. • Antibiotic Sensitivity: Vitek MS and manual Kirby Baur Disk diffusion method were used to determine the sensitivity pattern of the organism. The organism was found to be resistant to Amoxicillin – Clavulanic acid and sensitive to all Cephalosporins, Aminoglycosides, Tetracyclines, Piperacillin-tazobactam, Carbapenems and Polymyxins. • Diagnostic Confirmation: Both pus samples from different wound sites grew *Raoultella ornithinolytica*, confirming the diagnosis. Additionally, a third sample collected postoperatively from a discharging wound also grew *Raoultella ornithinolytica* with a similar sensitivity pattern, reconfirming the pathogen.

Postoperative Management: • Antibiotic regimen was changed from Amoxicillin – Clavulanic acid to Ciprofloxacin (IV), with additional coverage for anaerobic organisms using Metronidazole. • Regular wound care

was performed. • The postoperative course was uneventful and the patient showed gradual wound healing with no further complications. He was eventually discharged on oral antibiotics.

II. Discussion:

Raoultella ornithinolytica is a rare opportunistic pathogen that is primarily found in aquatic environments and soil. It has been implicated in various infections but is rarely reported in traumatic wound infections. This case suggests that retained foreign bodies can act as reservoirs for bacterial contamination, leading to delayed wound healing and secondary infections due to uncommon organisms.⁷

A literature review suggests that *Raoultella ornithinolytica* infections are often misdiagnosed due to their rarity.⁴ The organism is closely related to *Klebsiella* species and may exhibit similar virulence factors, including capsule formation, biofilm production and antibiotic resistance potential.⁵ However, in this case, the pathogen was resistant to Amoxicillin-Clavulanic acid but sensitive to all Cephalosporins, Aminoglycosides, Tetracyclines, Piperacillin-Tazobactam, Carbapenems and Polymyxins. Consequently, the patient was treated with Ciprofloxacin and Metronidazole, to which he responded well. While *Raoultella ornithinolytica* is inherently resistant to ampicillin and ticarcillin, it generally remains susceptible to other antibiotic classes, including aminoglycosides, quinolones, and cephalosporins. Reports of resistance to Amoxicillin-Clavulanic acid are few.²

Despite the patient being immunocompetent, with no history of diabetes, hypertension or other comorbidities, he developed a *Raoultella ornithinolytica* infection. This highlights the evolving pathogenic potential of this environmental microbe. The repeated isolation of the organism from three different wound samples further underscores its role as the causative pathogen rather than a mere contaminant. While this organism was resistant to Amoxicillin-Clavulanic acid, its identification raises concerns about the changing genetic patterns and pathogenicity of microbes previously considered non-infectious.

Thorough wound debridement and microbiological analysis are crucial in cases of persistent wound infections. Empirical antibiotic therapy may not always be sufficient and identification of uncommon pathogens is necessary to guide targeted therapy. Given the increasing reports of antibiotic-resistant strains of *Raoultella ornithinolytica*, early microbiological identification can significantly impact clinical outcomes.^{2,6}

Conclusion: This case emphasizes the importance of meticulous wound exploration and removal of foreign bodies in trauma-related infections. *Raoultella ornithinolytica* should be considered a potential pathogen in contaminated wounds. This case is noteworthy as one of the few reports documenting a *Raoultella ornithinolytica* strain resistant to Amoxicillin-Clavulanic acid. Prompt microbiological identification and targeted antibiotic therapy can lead to successful treatment and prevent complications. The confirmation of the diagnosis from three separate pus samples further reinforces the significance of thorough microbiological evaluation. The postoperative course was uneventful and the patient recovered completely. Initial treatment with Amoxicillin-Clavulanic acid, provided no relief from the infection due to the isolate's resistance. However, following operative drainage of the pus and a switch to Ciprofloxacin, the patient showed remarkable clinical improvement. This report highlights the need for increased awareness of rare pathogens in clinical practice and contributes to the limited but growing literature on *Raoultella ornithinolytica* in soft tissue infections.

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Xray suggestive of the said fracture on fifth metatarsal bone



Post surgical debridement image