Adult Prevotella denticola Digital Abscess with Citrobacter freundii and Enterococcus faecalis Superinfection: A Case Report

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ABSTRACT

Secondary to penetrating injuries, bacterial infections in the hand are well-reported and most frequently caused by gram-positive organisms. Although *Staphylococcus* and *Streptococcus* strains are the most common bacteria to infect the hand after an open injury, the musculoskeletal healthcare provider must be familiar with other potential infecting organisms when determining antibiotic coverage and management for the infected, traumatized hand. *Prevotella denticola* is a known colonizer of the gingiva and has been previously reported in oral and other systemic infections. *Prevotella denticola* may also present as a solitary pathogen or a participant in a mixed aerobic and anaerobic polymicrobial abscess. In this case report, the authors discuss a rare, deep hand infection in a previously healthy adult female with a Beta-lactamase positive *Prevotella denticola* and bacterial superinfection 8 months after a digital extensor tendon laceration and repair. Comprehensive culturing in hand infections should include anaerobic antibiotic susceptibility testing for secondary infections of the hand after penetrating trauma.

Keywords: Bacteria; Infection; Hand

INTRODUCTION

As part of the normal human microbiome, anaerobic species under certain circumstances can cause aggressive infections and induce bacterial resistance to antimicrobials. *Prevotella* species have been found in many mixed aerobic-anaerobic infections and can be Beta-lactamase positive, potentially sharing their genetic resistance with co-inhabiting bacterial species.[1] While numerous *Prevotella* species are known colonizers of the human gastrointestinal, oral, and vaginal mucosal surfaces, *Prevotella denticola* is an obligate anaerobic, gram-negative, pigmented rod that belongs to the genus Bacteroides. *Denticola* is a common inhabitant of the normal oral cavity flora and has been associated with periodontitis and dental diseases in children.[1] In this case, an adult patient developed a Beta-lactamase positive *denticola* digital abscess 8 months after a laceration injury and primary surgical tendon repair.

CASE HISTORY

A healthy, 42-year-old African American female presented for evaluation of a painful, swollen, indurated, and draining 1.5 cm lesion on the dorsal small finger of her non-dominant right hand 8 months after a previous work-related laceration. She is employed as a restaurant manager, and her initiating mechanism of injury was a laceration with broken glass. This resulted in an extensor tendon laceration to the involved digit that was surgically repaired at that time. Her recovery was uneventful until 8 months later, when she began draining pus from the area of her prior incision. Her previous surgeon initially treated the clinical infection with oral cephalexin. However, there was no improvement. The patient was subsequently referred for further treatment. Radiographs on referral did not show any evidence of osteolysis or bone deformity and she was afebrile. She subsequently underwent urgent surgical irrigation and debridement of a dorsal extensor digital abscess.

The surgical gram stain was positive for numerous gram-negative rods. Her final intra-operative cultures grew out a mixed aerobic-anaerobic infection primarily of *Prevotella denticola* with secondary growth of *Citrobacter freundii* and an *Enterococcus* species in broth only. Antibiotic susceptibility for *Prevotella*

denticola reported the following: Beta-lactamase positive with resistance to ampicillin, ceftriaxone, and Trimethoprim/Sulfamethoxazole, and susceptibility to ampicillin/sulbactam, ciprofloxacin, gentamycin, and clindamycin. The previous tendon repair was intact and permanent braided sutures around the tendon involved in the infection were retained. The tendon sutures were removed and the patient was treated with a single dose of intravenous clindamycin and 14 days of oral clindamycin. Her infection cleared without further sequela and all symptoms resolved. When the patient was informed of the culture results, she admitted to a long-standing habit of sucking her fingers at night. Four months after surgery, she was working full duty and there were no signs of recurrence.

DISCUSSION

Because anaerobic bacteria are known to be part of the normal human flora, they were previously dismissed as the infecting organism when involved with a mixed aerobic-anaerobic infection. Due to the advancement in microbiology sciences and improved classification of infectious bacteria, there has been an increased awareness of anaerobic, gram-negative rods and their role in solitary or mixed infections, including those affecting the musculoskeletal system. In cases of mixed infections, there may be one or more anaerobes in conjunction with an aerobe. The combination of mixed aerobic and anaerobic infections likely creates a synergistic effect through potential sharing of genetic material and establishment of a favorable environment for bacterial growth. In one study looking at the oral flora of 23 healthy children, 70.0% of the *Prevotella* species isolated were B-lactamase positive.[2] Given the increasing incidence of B-lactamase production in anaerobic gram-negative rods and the understanding of anaerobic bacteria as an infecting agent, susceptibility testing is now considered more routine.

Several anaerobic bacterial species of oral origin, including pigmented *Prevotella*, can be involved in oral and non-oral infections, affecting both adults and children. In rare cases, *Prevotella denticola* has been isolated from other non-oral sites and has been reported as the causative infecting organism in cerebral abscesses, life-threatening visceral abscess, and septic spondylitis.[3-6] Endovascular infection, endocarditis, and paronychia due to other *Prevotella* subspecies have also been described in the literature.[5,7,8] Beta-lactamase production by pigmented gram-negative rods has been well-documented.[5,9] In this case, the *denticola* was Beta-lactamase positive and there was an anaerobic-aerobic superinfection with *Citrobacter* and *Enterococcus*. A search of the English literature identified *denticola* in association with pediatric periodontal disease, but no reports were found in adult hand infections.[10] Paronychia infections have been previously associated with individuals who bite their nails because of the direct inoculation of mouth flora by sucking or biting, which is thought to be the cause of most pediatric nail infections.[11,12] The nail fold was not involved in this infection, and this patient later admitted to a habit of digital oral sucking, which was likely the inoculating mechanism and source of the *denticola*.

As antibiotic resistance emerges and infection trends evolve, broad staining, culturing, and susceptibility-testing for aerobic, anaerobic, fungal, and acid-fast organisms irrespective of the musculoskeletal location of infection, has become even more important.

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