-By the Skin of his Teeth; A Used Toothpick induced Polymicrobial Necrotic Abscess of the Heel.

Case Report

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Abstract

Case A 72-year-old non-diabetic, immunocompetent man presented 2 weeks after stepping on a toothpick he had used for dental hygiene, with a 15 × 9-cm necrotic plantar heel abscess unresponsive to oral flucloxacillin and incision. He underwent debridement and negative-pressure wound therapy. Cultures grew *Eikenella corrodens*, *Aggregatibacter segnis*, and *Haemophilus parainfluenzae*. He received 2 weeks of intravenous ceftriaxone and metronidazole, then 2 weeks of oral Flucloxacilin. At 8 weeks, the wound had healed without recurrence.

Conclusion: Used toothpicks can inoculate HACEK oral flora that standard anti-staphyloccal regime may not cover. Detailed history, early debridement and targeted antibiotics are required, even in healthy, immunocompetent patients.

Introduction

Budnick et al. reported an estimated 8,176 yearly toothpick-related injuries annually within the United States in the early 1980s, with the highest prevalence seen in the paediatric population[1]. Foreign body-related infection and osteomyelitis are well recognised clinical entities and encountered regularly in routine practice. Wooden foreign bodies, such as toothpicks, pose a distinctive challenge due to being radiolucent, more likely to splinter further and, due to their porous organic nature, acts as a reservoir for microorganisms and therefore more likely to harbour bacteria than metal or glass[2-5].

Plantar puncture wounds, including to the heel, are classically associated with *Pseudomonas Aeruginosa*, particularly in cases where the foreign body has passed through footwear[6,7]

A toothpick that has been used for dental hygiene, however, carries oral flora. *Eikenella corrodens*, a facultatively anaerobic gram-negative bacillus best known from human bite wounds, has been reported after toothpick puncture of the foot[8,9] and *E. corrodens* foot osteomyelitis has been described mainly in diabetic patients[10,11]. Aggregatibacter segnis, a slow-growing oropharyngeal commensal, has only recently been associated with skin and soft-tissue infection[12].

We report a case of necrotic foot abscess secondary to a puncture injury from a recently used toothpick in a non-diabetic, immunocompetent patient, with *E. corrodens, A. segnis*, and *H. Parainfluenza* growth. The patient was informed that data concerning the case would be submitted for publication, and he provided consent.

Presentation

A 72-year-old gentleman presented to the Emergency Department with a 2-week history of worsening pain, erythema, swelling, and discharge from his right heel. This occurred following standing down on a toothpick which had been previously used for his own dental care. The patient removed the toothpick himself, reporting to have been imbedded 4cm into the heel, and removed in its entirety. One week later, he developed increasing pain, erythema and a firm collection over his heel. His General Practitioner lanced the collection and prescribed flucloxacillin 500mg QDS for 1 week. The wound failed to improve, and he was referred for orthopaedic assessment

Examination

Examination revealed a 15 x 9cm abscess on the planter aspect of the right heel with purulent discharge, erythema extending from the heel to 3cm above the ankle, and superficial necrotic tissue surrounding the puncture site (*Figs. 1-A and 1-B*). The foot was well perfused, neurologically intact with full range of motion at the ankle and no bony tenderness. He denied any systemic symptoms, including fevers, diaphoresis and weight loss. He had no history of diabetes mellitus, smoking, corticosteroid use, or immunosuppression. His medical history included benign prostatic hyperplasia and anxiety. He lived with his wife, with no evidence of self-neglect. The C-reactive protein level was 106 mg/L, the white blood-cell count was 13.1×10^9/L, and the neutrophil count was 10.49×10^9/L. Radiographs of the right foot showed no evidence of osteomyelitis. Cultures of the discharge were sent. Given the atypical mechanism, intravenous piperacillin-tazobactam was started after consultation with the microbiology and infectious diseases teams for empirical coverage of oral flora.

Management

At surgery, there was extensive erythema, slough, and purulent discharge, with an abscess cavity measuring approximately 15 cm mediolaterally and 9 cm craniocaudally. Non-viable skin was debrided, revealing a 2 × 1.5-cm central area of necrosis at the heel tip, 1.5 cm deep. This nidus was explored, and its base and edges were curetted to exclude loculations or retained fragments of the toothpick. Deep tissue specimens were sent for culture, and negative-pressure wound therapy was applied (*Figs. 2-A and 2-B*). Elevation was encouraged.

Cultures grew mixed oral flora, predominantly *E. corrodens*, *A. segnis*, and *H. parainfluenzae*. After 72 hours of piperacillin-tazobactam, treatment was changed to intravenous ceftriaxone 2g once daily and metronidazole 500 mg 3 times daily. After 2 weeks of intravenous therapy, he was discharged on oral metronidazole 400 mg and cephalexin 500 mg, each 3 times daily, for 2 further weeks, with outpatient follow-up. Four weeks after surgery, wound edge was well perfused with no further evidence of infection, with normal inflammatory markers (*Figs. 3-A and 3-B*). He had returned to full weight bearing, and no radiological evidence of osteomyelitis.

Discussion

Toothpicks are a ubiquitous household item, routinely employed for food garnishing, and often repurposed for expedient dental hygiene; toothpicks carry inherent risks that are frequently under-appreciated. In Orthopaedic practice, such penetrating injuries as this warrant particular vigilance, particularly in weight-bearing region such as the heel, as they can precipitate deep soft tissue infection, abscess formation and secondary osteomyelitis if not promptly addressed. Wooden foreign bodies, including toothpicks, present unique diagnostic and therapeutic challenges. Unlike radio-opaque materials, such as glass or metal, wood is characteristically radiolucent, rendering poor visualisation on plain radiographs[4].

The tendency of toothpicks to fragment during extraction increases the likelihood of retained splinters which serve as a nidus for persisting infection[2,5]. The porous structure also facilitates bacterial adherence and biofilm formation[3]. Because our patient removed the toothpick himself, thorough debridement and washout were necessary to exclude retained fragments. Delayed presentation is typical of toothpick injuries, sometimes by years[9,13,14]. Larcher et al. described a decade of unexplained heel pain caused by an unrecognized toothpick in a 26-year-old patient[13].

The microbiology of toothpick-related injuries reflect the bioburden of the oral cavity, where contaminated toothpicks introduce a polymicrobial inoculum upon skin puncture. In this case, all three predominant isolates in our case belong to the HACEK group: fastidious, slow-growing gram-negative organisms that are infrequently implicated in orthopaedic infection, some of which produce β-lactamase, and for which interpretive criteria for susceptibility testing are limited[15]. This polymicrobial profile differs from the *Pseudomonas*-dominant profile of classic plantar puncture wounds[6,7], and both *A. segnis* and *H. parainfluenzae* are rare musculoskeletal pathogens[16,17]

Melton et al. described a similar injury from a used toothpick in an elderly diabetic patient whose foot abscess grew *E. corrodens* and *Peptostreptococcus* and did not respond to empirical antibiotics until therapy was retargeted[9]. This mirrors the failure of flucloxacillin in our patient and shows that empirical regimens

aimed at skin flora may be insufficient against oral commensals. Robinson and Kourtis reported *E. corrodens* osteomyelitis after toothpick puncture of the foot in a young woman[8]. Davanos et al. described an *E. corrodens* and *Actinomyces odontolyticus* foot abscess in a penicillin-allergic patient that required 10 weeks of doxycycline[18]. *E. corrodens* foot osteomyelitis has been reported predominantly in diabetic patients, from the 3 cases described by Konugres et al.[10] to later reports[11]. Our case adds to the small body of evidence that this infection is not confined to diabetic or immunocompromised patients.

A. segnis is poorly described outside endocarditis. In a retrospective cohort, Bapat et al. identified a novel association between *A. segnis* and skin and soft-tissue infection, and invasive *Aggregatibacter* infection was associated with socioeconomic deprivation and with periodontitis or recent dental work[12]. *A. segnis* has also been isolated with *E. corrodens* in a sinogenic epidural abscess[19], suggesting that these commensals may act synergistically rather than as incidental contaminants. Ceftriaxone and metronidazole were also effective, after drainage, in a mixed *Actinomyces israelii* and *Aggregatibacter actinomycetemcomitans* infection with multiple abscesses, including one in the foot[20].

The strengths of this case adhered with orthopaedic principles for contaminated foreign body injuries; prompt surgical intervention with thorough debridement, judicious imaging to exclude osteomyelitis and targeted antimicrobial stewardship, with ongoing meticulous wound care[14]. The absence of diabetes or immunosuppression in our non-smoking patient reinforces that toothpick injuries pose risks even to non-medically co-morbid patients.

Conclusion

While literature predominately links most infection to diabetic and immunocompromised individuals, this case highlights that wooden foreign bodies - particularly those recently contaminated with oral flora - can pose significant risk of infection in immunocompetent individuals. This case is a stark reminder of the insidious clinical course of opportunistic infection, particularly due to initial failed conservative management. Clinicians should maintain a low threshold for surgical exploration, advanced imaging and broad antibiotic cover in cases of penetrating toothpick injuries, especially is previously utilised for oral hygiene. Perhaps further public health efforts might promote dental floss as a safer alternative.

Appendix 1

Figure 1A and 1B: Pre-operative Images



Figure 2A and 2B: Intra-operative Images



Figure 3A and 3B: Four weeks post procedure



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