



Case report

Tissierella praeacuta bacteremia, a rare complication of osteomyelitis

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ABSTRACT

Tissierella praeacuta, also known as *Clostridium hastiforme* is an anaerobic gram negative bacteria, first isolated in 1908, by P.H. Tissier. To date, there are currently six documented cases of this environmental organism causing infection in humans. Here, we present a patient who was admitted to hospital with osteomyelitis of his right calcaneus, found to subsequently have *T. praeacuta* bacteremia isolated from anaerobic blood cultures. During his inpatient course, he was treated with IV vancomycin, cefepime, and metronidazole in addition to surgical debridement of his foot wound. The patient was discharged on a course of oral Levofloxacin and Amoxicillin-Clavulanate with significant clinical improvement.

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Introduction

Tissierella praeacuta, also known as *Clostridium hastiforme*, is an anaerobic gram negative bacteria found in the human microbiome and environment [1]. Although this bacterium was originally isolated by P.H. Tissier in 1908, there are few documented cases of human infection. Furthermore, in these rare cases, *T. praeacuta* infection has only been documented in six limited clinical presentations - septic pseudoarthrosis [1], bacteremia secondary to septic arthritis, fistula formation and pyometra [1–3], brain abscess [4] and eyelid gas gangrene [5]. Here, we report the first documented case of a *T. praeacuta* bacteremia as a complication of osteomyelitis.

Case

A 62-year-old male with a past medical history of hypertension, hyperlipidemia, coronary artery disease, with three-vessel coronary artery bypass graft, type 2 diabetes, complicated by mid-foot amputation and end stage renal disease on dialysis, presented to our hospital with right foot pain associated with drainage from an open right foot wound.

The patient had noted a one-month history of right lower extremity pain, heat, and white, foul-smelling discharge from an open wound on his right heel. On presentation, his vital signs were notable for a blood pressure of 197/86 mmHg, and he was afebrile. His

physical exam revealed an open foot wound on the plantar aspect of the right heel without discharge, but with visible and malodorous fascia. There was no visible bone, and his pedal pulses were palpable. A lab evaluation was notable for white cell count of 17,200/uL with 1.9% bands, lactic acidosis of 2.6 mmol/L, and C-reactive protein elevated to 160 mg/dL. An x-ray of the right foot revealed possible osteomyelitis of the calcaneus with soft tissue ulceration and subcutaneous gas; a subsequent MRI confirmed calcaneal osteomyelitis. Regarding his medical history, patient had a history of Type 2 Diabetes Mellitus, that was complicated by diabetic nephropathy, requiring three times weekly dialysis. Due to poor outpatient follow up, he had no pre-recorded hemoglobin a1c and was not on insulin nor any oral hypoglycemic agents to treat Type 2 Diabetes Mellitus.

The patient was admitted to the hospital and received empiric Vancomycin and Cefepime for seven days, pending culture data. Ultimately, blood cultures were sent to the lab and terminal spores were identified prompting rapid biochemical testing that revealed *T. praeacuta*. A subsequent orthopedic debridement revealed wound cultures growing *Proteus penneri/vulgaris* and moderate *Enterococcus faecalis* in anaerobic cultures. His antibiotics were broadened to include Metronidazole in response to the culture results on day two of his admission, and he was ultimately discharged to complete a six-week course of oral Levofloxacin and Amoxicillin-Clavulanate. In addition to oral antibiotics, patient also was discharged with vacuum assisted closure of his foot wound and orthopedic and plastic surgery follow up. He was due for outpatient removal of his wound vacuum, however passed away within one month of discharge from his chronic co-morbidities.

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Discussion

T. praeacuta is a gram negative obligate anaerobe from the clostridium family [1]. It is also known as *Clostridium hastiforme* with a 99.9% similar 16 s RNA structure [1]. The *Tissierella* genus is associated with 3 species: *T. praeacuta*, *T. creatinini*, *T. creatinophila*. Of the three species, only *T. praeacuta* is known to cause clinically-relevant infection, and is thought to inoculate via contaminated soil. A comprehensive review of the available medical literature reveals that, to date, *T. praeacuta* infection has been reported in six clinical scenarios – a report of two cases and literature review describes a first case being a case of *T. praeacuta* isolated from a septic pseudarthrosis likely secondary to an open femur fracture; the second case describing a patient with pyonephrosis communicating with a liver abscess, found to have *T. praeacuta* bacteremia [1,2]. Another case report of an anaerobic brain abscess following chronic suppurative otitis media isolated *T. praeacuta* in brain abscess culture, thought to possibly be due to translocation from otitis media treated by herbal plant extract [4]. *T. praeacuta* was also identified in a patient with colorectal adenocarcinoma who presented with a septic shock, found to have *T. praeacuta* bacteremia, despite lack of isolation in stool and urine culture [6]. *T. praeacuta* has also been identified in eyelid gas gangrene as well as in a patient with a pyometra secondary to a chronically inserted IUD with positive *T. praeacuta* cultures from the pus isolated from uterine cavity [3,5].

These same cases reported antibiotic sensitivity to beta lactams, Metronidazole, and Rifampicin [1,3,5,6]; these cases were simultaneously treated with a combination of surgical debridement of the infected area as well as Piperacillin-Tazobactam intravenously and/or Metronidazole as an oral switch [1,3,4,6]. Traditionally, the *Clostridium* species are treated with Penicillin. In our case presented above, the patient was originally treated with Vancomycin, Cefepime, and Metronidazole, but narrowed to an oral fluoroquinolone and a beta lactam antibiotic with beta lactamase inhibitor after cultures returned and source control was achieved with surgical incision and debridement.

This case is particularly interesting as it is a unique organism to cause a diabetic foot infection and subsequent bacteremia. Diabetic foot infections are classically caused by *Staphylococcus aureus* or *Streptococcus* species, which should be treated with Cephalexin or Dicloxacillin [7]. As gram negative bacilli and anaerobes can also infiltrate diabetic foot wounds, these infections can alternatively be treated with Amoxicillin Clavulanate plus Trimethoprim Sulfamethoxazole [7]. Anaerobes tend to be the primary organism in diabetic foot infections in wounds that are chronic or deeper, as seen in our patient [8]. For severe, limb threatening, diabetic foot infections, treatment can include Metronidazole plus a third generation

cephalosporin and Vancomycin if methicillin resistant *Staphylococcus aureus* (MRSA) coverage is also required [7]. It is important to note that it is classically more difficult to grow anaerobic bacteria due to specific environmental requirements that can be hard to achieve in a normal microbiological setting, hence why our patient above had positive blood culture but negative tissue culture of *T. praeacuta* [8].

Conclusion

This is the first case of *T. praeacuta*, a rare gram negative anaerobe, that was identified in a blood culture of a patient presenting with osteomyelitis of the foot. Although there is currently very little evidence and reporting of such cases, *T. praeacuta* should be considered a bacterial differential in cases of open wounds with exposure to environmental sources.

CRediT authorship contribution statement

Malika Gill: Conceptualization, Investigation, Writing – original draft, Visualization. **Jason Bofinger:** Writing – reviewing & editing, Supervision. **Alexander Glaser:** Writing – reviewing & editing, Supervision.

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