

Tissierella praeacuta Bacteremia Associated With Acute on Chronic Osteomyelitis: A Case Report

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Abstract

Tissierella praeacuta is a rare gram-variable bacillus that naturally occurs in the environment and is pathogenic in humans with chronic infections. We report the case of a 45-year-old man with a history of chronic osteomyelitis of the left tibia and recurrent bacteremia secondary to intravenous drug use (IVDU). He had previously received multiple partially completed courses of antibiotics over the past one year. Blood cultures demonstrated polymicrobial infection, including *T. praeacuta* and methicillin-sensitive *Staphylococcus aureus* managed with parenteral beta-lactams, and the subsequent first surveillance cultures remained sterile. Medical literature on human infections with *T. praeacuta* is limited due to its rare occurrence. Most cases have reported sensitivity to beta-lactam antibiotics, making them an antibiotic of choice. *T. praeacuta* infections should prompt a search for additional underlying infectious foci and treatment of any additional co-infecting microbes.

Categories: Internal Medicine, Infectious Disease, Substance Use and Addiction

Keywords: tissierella, ivdu, bacteremia, cellulitis, osteomyelitis

Introduction

Tissierella praeacuta is a gram-variable bacillus that naturally occurs in the soil and has been rarely reported as pathogenic in humans [1,2]. It has reportedly been a causal agent in polymicrobial infections. We report the case of a 45-year-old man with active intravenous drug use (IVDU) who was found to have *T. praeacuta* bacteremia in the setting of acute on chronic tibial osteomyelitis. A literature search of case reports using the terms "*Tissierella praeacuta*" or "*Clostridium hastiforme*" in the PubMed/MEDLINE database did not reveal any other cases of *T. praeacuta* infection in a patient with IVDU.

Case Presentation

A 45-year-old man with a history of chronic hepatitis C infection, opioid IVDU, chronic osteomyelitis of bilateral lower extremities, and right below-knee amputation secondary to osteomyelitis presented to the hospital with fever and progressive worsening of left leg pain associated with purulent discharge from chronic left leg wound for four days. His left leg wound developed four months ago at an IVDU injection site that gradually increased in size and became purulent. He had been previously treated on multiple occasions over the past four months for recurrent IVDU-associated cellulitis and bacteremia (*Bacillus cereus*, carbapenem-resistant *Acinetobacter baumannii*, *Streptococcus viridins*, *Staphylococcus aureus*, *Staphylococcus hominis*, *Clostridium sporogenes*, *Clostridium botulinum*, and *Pseudomonas aeruginosa*) with intravenous vancomycin, cefepime, metronidazole, and oral trimethoprim-sulfamethoxazole. He had a long history of prematurely leaving against medical advice during hospitalizations after partial antibiotic treatments, including his last hospitalization when he also underwent debridement and skin graft placement one month ago. Despite extensive counseling from inpatient substance use recovery service, he reported continued struggle with intravenous drug injection into the leg wound. The patient reported housing instability. In addition, while he didn't report any overt contamination of the wound with soil, he admitted to suboptimal hygiene and wound care prior to the hospitalization. In the current presentation, his vitals were pertinent for hypothermia of 35.7°C and tachycardia of 116 beats per minute. Local examination revealed an ulcerated wound (32x24 cm) with multiple staples from previous skin graft surgery on the left leg with erythema, swelling, and tenderness (Figure 1a). Laboratory evaluation showed normal leukocyte count, microcytic anemia (hemoglobin 10.1 g/dl), elevated C-reactive protein of 5.74 mg/dl (Ref range <0.29 mg/dl), and erythrocyte sedimentation rate of 42 mm/hour (Ref range ≤15 mm/hour). The human immunodeficiency virus (HIV) test was negative. Left leg computed tomography showed periosteal thickening and erosions in the mid-to-distal tibia and fibula, suggesting chronic osteomyelitis (Figure 1b).

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FIGURE 1: (a) Image of the left lower extremity cellulitis. (b) Contrast-enhanced computed tomography scan of the left lower extremity showing an underlying periosteal reaction, erosive changes, and cortical thickening along the left tibial shaft, suggestive of osteomyelitis.

Empiric parenteral vancomycin, ceftriaxone, and metronidazole were started. On day 2, blood cultures grew gram-variable anaerobic bacilli, confirmed as *T. praeacuta* (sensitive to beta-lactams, clindamycin, and metronidazole); therefore, antibiotic coverage was switched to intravenous ampicillin-sulbactam on day 3. Wound debridement was performed on day 6. Intraoperative tissue cultures grew methicillin-sensitive *Staphylococcus aureus*, *Enterobacter cloacae*, *Enterococcus faecalis*, and *Clostridium sporogenes*. Oral ciprofloxacin was added to ampicillin-sulbactam to treat the resistant *Enterobacter* strain. On day 13, the patient decided to leave prematurely against medical advice. He was educated to complete oral ciprofloxacin and doxycycline course of 6 weeks, abstinence from IVDU, and clinic follow-up with infectious disease. Notably, the patient was followed by the addiction medicine consult service as well as peer recovery coach services throughout his stay. He was provided extensive abstinence counseling and given resources for outpatient follow-up with the addiction medicine team.

Discussion

T. praeacuta is a gram-variable obligate-anaerobic bacillus, originally named *Bacteroides praeacutus* by H. Tissierella after extraction from infant feces in 1908 [1]. *Clostridium hastiforme*, a closely related bacterium, is now renamed *Tissierella praeacuta*, classified under phylum Firmicutes, order Clostridiales, and family Peptostreptococcaceae (or incertae sedis XI) [1,2]. *T. praeacuta* naturally occurs in anaerobic sludge, soil, and human microbiota. Of the five species under the *Tissierella* genus (*T. praeacuta*, *T. creatinini*, *T. pigra*, *T. carlieri*, and *T. creatinophila*), only *T. praeacuta* is reported to be pathogenic to humans [3]. A literature search of case reports using the terms "*Tissierella praeacuta*" or "*Clostridium hastiforme*" in the PubMed/MEDLINE database did not reveal any other cases of *T. praeacuta* infection in a patient with IVDU. *Tissierella* bacteremia has been previously reported to co-infect patients with chronic infections such as calcaneal osteomyelitis in a diabetic patient [4] and sacral decubitus ulcer [3], successfully treated with beta-lactams. Other reported cases include knee arthroplasty, pyonephrosis with communicating liver abscess [5], brain abscess secondary to otitis media in a child [6], sepsis secondary to colon adenocarcinoma [7], eyelid gas gangrene [8], and pyometra secondary to an intrauterine device [9]. Most cases are successfully treated with beta-lactams, although susceptibility to rifampicin and chloramphenicol is also reported.

We performed a literature search of the case reports/series published in the English language from inception to August 2023 using the terms "*Tissierella praeacuta*" or "*Clostridium hastiforme*" in the PubMed/MEDLINE database. A supplementary search was carried out by two authors (AS and WK) manually to locate any additional publications. This yielded a total of 10 known cases of pathogenic and one colonizer, *Tissierella praeacuta* (Table 1).

| AUTHOR | YEAR | Age, Sex | DIAGNOSIS | CO-PATHOGEN | SUSCEPTIBILITY | TREATMENT |
|-----------------|------|----------|-----------------------|--|----------------|--|
| Yang et al. [3] | 2022 | 45, M | Chronic Sacral Wounds | <i>Proteus mirabilis</i> , <i>Prevotella bergensis</i> , <i>Bacteroides fragilis</i> , and <i>Parvimonas</i> sp. | Not reported | Piperacillin-tazobactam 3.375 g every six hours IV for a total of 14 days |
| | | | | <i>Proteus penneri/vulgaris</i> | | Wound debridement and vacuum-assisted closure. Initial treatment with cefepime and |

| | | | | | | |
|------------------------|------|-------|--|---|--|--|
| Gill et al. [4] | 2022 | 62, M | Osteomyelitis | and Enterococcus faecalis. | Not reported | metronidazole. Additional six-week treatment with oral Levofloxacin and Amoxicillin-Clavulanate. |
| Caméléna et al. [5] | 2016 | 35, M | Pseudarthrosis of fractured long bone (femur) | Enterobacter cloacae. | Piperacillin – tazobactam Beta lactams Metronidazole Chloramphenicol Rifampicin | Piperacillin/tazobactam 4 g three times a day IV and metronidazole 500 mg three times a day for six weeks. |
| Caméléna et al. [5] | 2016 | 74, M | Pyonephrosis | Streptococcus anginosus, Proteus mirabilis and an extended- spectrum beta-lactamase-producing Escherichia coli. | Piperacillin – tazobactam Metronidazole Chloramphenicol Rifampicin | Meropenem 3 g per day for 14 days |
| Cox et al. [6] | 2009 | 10, M | Brain abscess Otitis media | Morganella morganii, Proteus mirabilis, Corynebacterium amycolatum, Bacteroides fragilis, and Enterobacter cloacae. | Not reported | Meropenem 120 mg/kg/day every eight hours failed percutaneous drainage Abscess resection with craniotomy |
| Houssany et al. [7] | 2016 | 67, F | Septic shock Colorectal cancer with multiple stomas. Chemotherapy-induced aplasia. | Escherichia coli and Staphylococcus aureus. | Piperacillin Amoxicillin/clavulanate Cefotaxime Imipenem Chloramphenicol Clindamycin Ciprofloxacin Metronidazole Vancomycin. | Piperacillin – tazobactam for 14 days |
| Lyon et al. [8] | 1989 | 31, M | Eyelid Gas gangrene | None. | Metronidazole Ceftriaxone Penicillin | Cephalexin 500 mg four times daily Surgical debridement |
| Ørum et al. [9] | 2017 | 64, F | Pyometra | Bacteroides fragilis. | Penicillin G Meropenem Clindamycin Metronidazole | Cefuroxime intravenous 1500 mg and metronidazole 500 mg, both three times a day for six days. Oral pivampicillin 700 mg three times a day and metronidazole 500 mg twice a day for an additional 7 days. |
| Williamson et al. [10] | 1977 | 4, M | Colonizer in Severe combined immune deficiency (SCID) | About 35 microorganisms (unknown if contaminants). | Not reported | Not treated. Reportedly colonizer. Source of specimen not reported. |
| Welsh et al. [11]. | 2015 | 49, F | Leg wound | None. | Not reported | Piperacillin – tazobactam |
| Samanta et al. [12] | 2016 | 49, F | Rectal carcinoma Rectovaginal fistula Intrauterine device (IUD) present | None. | Not reported | Explorative laparotomy, palliative diverting loop colostomy, IUD removal. Piperacillin – tazobactam, then Metronidazole for a total antibiotic course of 14 days. |
| Chandok et al. [13] | 2023 | 24, F | Septic Ovarian Thrombophlebitis | None. | Beta-lactams Chloramphenicol Meropenem Metronidazole | Piperacillin-tazobactam was switch to meropenem. Discharged on oral metronidazole with oral amoxicillin-clavulanate. |

TABLE 1: A literature review of reported cases of Tissierella praeacuta.

M- male; F- Female.

For patients with bacteremia-related osteomyelitis and IVDU, the possibility of rare pathogens like *T. praeacuta* should be suspected, especially when the clinical course is prolonged, or bacteremia is polymicrobial.

Conclusions

Very little is known about the prevalence and risk factors associated with *T. praeacuta* due to scant reporting in the current literature. *T. praeacuta* generally occurs as a co-infecting pathogen and should be considered in the differentials, especially for patients suspected to be at-risk, like IVDU or with chronic infections. This is the first case description of *T. praeacuta* infection in a patient using drugs and actively injecting into his wound. *T. praeacuta* is generally sensitive to beta-lactam antibiotics; a comprehensive treatment plan entails source identification, antibiotic treatment with beta-lactams, and/or surgical intervention if indicated.

Additional Information

Disclosures

Human subjects: Consent was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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