IDCases 10 (2017) 115–116

Contents lists available at ScienceDirect

IDCases

journal homepage: www.elsevier.com/locate/idcases

Case report

Robinsoniella peoriensis infection related to right femoral hardware

Justin Schmetterer[a,*], Joseph Gorvetzian[b], Shaun Yang[c]

[a] Presbyterian Healthcare Services, Albuquerque, NM, United States
[b] Infectious Disease and Internal Medicine Associates P.C., Albuquerque, NM, United States
[c] Tricore Reference Laboratories, Albuquerque, NM, United States

ARTICLE INFO

Keywords:
Robinsoniella peoriensis
Robinsoniella
R. peoriensis
Abscess
Hardware

ABSTRACT

Discovered in swine manure relatively recently, *Robsinoniella peoriensis* is a gram-positive anaerobic bacilli that has been reported to cause human infections. Its antimicrobial susceptibility, epidemiology and overall pathogenicity are still not fully understood. We report a case of a hardware related soft tissue infection in the right femur caused by *Robinsoneilla peoriensis* following an open reduction internal fixation in a 67 year old immunocompetent woman. The patient was successfully treated with six weeks of ertapenem.

Introduction

Robinsoniella peoriensis is a gram-positive, anaerobic, spore-forming bacilli that has been isolated in the feces of swine, turtles and more recently, in the human gut of healthy premature neonates [1]. The bacterium belongs to phylum *Firmicutes* within the family *Lachnospiraceae.* In recent years, *R. peoriensis* has been increasingly isolated from human infections including intra-abdominal, bloodstream, soft tissue and prosthetic joint/hardware infections. The patient outcomes in these studies varied significantly depending on the site of the infection [1–6]. We describe a patient with a subperiosteal abscess of the right femur that developed subsequent to a right femur open reduction internal fixation (ORIF).

Case report

A 67-year old woman with a past medical history significant for chronic kidney disease and hypertension, sustained a fracture of her right femur in December 2015 requiring a distal femur ORIF. Approximately one month later, the patient was seen for signs of hardware failure and a small superficial abscess at the distal end of her incision. She underwent revision of the ORIF on 20 January 2016. Repeat X-rays demonstrated healing of the fracture. The patient was non-weight bearing and primarily used a wheelchair thereafter.

On 13 May 2016, approximately six months from initial hardware placement, the patient reported to an urgent care clinic with three days of flu-like symptoms associated with aches and chills. She developed swelling in her right leg tracking from her thigh to her knee. She was discharged on oral clindamycin. Over the next several days the lateral lower thigh became swollen and fluctuant. The patient presented to her orthopedic surgeon and underwent an incision and drainage (I & D) of the developing distal femur abscess. Copious amounts of purulent fluid was noted deep in the wound concerning for an infection of her implants. Gram stain yielded gram-positive cocci however cultures remained negative, potentially due to oral antimicrobial exposure prior to sampling. The patient completed a six-week course of intravenous daptomycin dosed at 6 mg/kg every 24 h on 22 June 2016. She received three months of oral doxycycline 100 mg twice daily thereafter.

Radiographic studies revealed signs of a nonunion of the femur, and a fractured rod was noted in July 2016. Antimicrobials were held for two weeks and she was admitted to our hospital on 17 August 2016. The patient was taken back to the operating room for right femur deep hardware removal and debridement of deep tissue and bone. Seven cultures were obtained at multiple sites along the femur bone, hardware plate and tissues surrounding the hardware. On admission, the patient was afebrile and demonstrated a white blood cell count of 11,300 cells/mm^3. C-reactive protein was 7.3 mg/L, and the erythrocyte sedimentation rate was 61 millimeters per hour (mm/h).

Vancomycin was initiated on day one of admission and adjusted by serum trough levels accordingly. On day five of hospitalization ampicillin/sulbactam 3 g IV every 6 h was initiated. Six out of the seven cultures obtained from the surgical procedure were all positive for *R. peoriensis* identified by the 16S ribosomal RNA sequencing. The organism was initially reported by the clinical microbiology lab as an anaerobic gram-positive bacilli. The lab routinely uses MALDI-TOF (matrix assisted laser desorption ionization-time of flight), a mass spectrometry based technology for bacterial species identification. However, it couldn't provide the further result on the isolate most likely

* Corresponding author. Present/permanent address: 1100 Central SE, Albuquerque, NM 87106, United States.
E-mail address: Jschmette2@phs.org (J. Schmetterer).

http://dx.doi.org/10.1016/j.idcr.2017.10.003
Received 22 September 2017; Received in revised form 11 October 2017; Accepted 11 October 2017

Table 1
Robinsoniella spp. susceptibly panel.

Antimicrobial	MIC (mcg/ml)
Ampicillin/Sulbactam	1/0.5
Clindamycin	4
Meropenem	0.5
Metronidazole	0.5
Penicillin	8
Piperacillin/tazobactam	8/4

due to the limitation of the mass spectrometry database. On day seven the patient had several febrile episodes with a maximum temperature of 101.1 ˚F. The patient's antimicrobials were converted to ertapenem 1 g IV daily and she was discharged on day eight after the fevers resolved. The patient was maintained on a non-weight bearing status. A peripherally inserted central catheter was placed and the patient was then followed by Infectious Disease in an outpatient setting.

The isolate was sent to ARUP laboratories to establish minimum inhibitory concentrations. There are no currently established susceptibility breakpoints specifically for *Robinsoniella* spp. Antimicrobial susceptibility was tested via a custom panel broth microdilution panel and evaluated using the Clinical and Laboratory Standards Institute (CLSI) breakpoints for gram-positive anaerobes. The strain revealed elevated minimal inhibitory concentrations (MIC) against penicillin (8.0 mcg/mL), and clindamycin (4 mcg/mL) after 48 h of anaerobic incubation using both the Etest and ATB ANA strip. Low MIC's were found for ampicillin/sulbactam (1/0.5 mcg/ml), piperacillin-tazobactam (8/4 mcg/mL), meropenem (0.5 mcg/mL), and metronidazole (0.5 mcg/mL) (Table 1). The patient responded well and completed a six-week course of Ertapenem on 5 October 2016. Laboratory values obtained 14 November 2016 were improved with an ESR of 43 mm/h and C-reactive protein of 0.3 mg/L. On 7 December 2016 the patient underwent a right intramedullary rodding that was uneventful.

Discussion

Robinsoniella peoriensis was first isolated in 2003 from a swine-manure storage pit [7]. Strains of this species have been identified from the gastrointestinal (GI) tracts of a variety mammals, suggesting it may be a member of the commensal microflora of these animals [3]. However, it is unclear if this organism is also part of the human GI tract commensal microflora or could transiently colonize the human GI tract. Phylogenetic analysis showed that this organism fits into the clostridial rRNA cluster XIVa subgroup, with the closest related genus being Ruminococcus [8]. The organism was named *R. peoriensis* after an American scientist working in livestock related microbiology [1]. Cotta et al. described *R. peoriensis* as an oval-to-rod shaped bacterium with subterminal spores that grows in 5% CO2 or under anaerobic conditions at 37 ˚C. It produces small, nonhemolytic colonies (0.5–1.5 mm) and ferments glucose, lactose, and maltose. It does not reduce nitrate or produce indole [7].

This organism may be problematic to identify and differentiate from other anaerobic bacterial species of similar morphologies without more advanced technologies. Whitehead et al. describes the use of specific PCR primers to the 16S rDNA gene of *R. peoriensis* to rapidly and accurately identify the strain when recovered from human infections as well as other ecological sources. In our case, the clinical microbiology laboratory identified the organism by using the 16S ribosomal RNA sequencing, which is the only reliable method for its identification.

This organism appears to have variable susceptibility patterns. Some cases reported low MICs to ampicillin, piperacillin/tazobactam, ertapenem, metronidazole and vancomycin [2,8]. Other studies have reported elevated MICs to penicillin, clindamycin, and moxifloxacin [1,2,8]. Overall, piperacillin/tazobactam, ertapenem, and metronidazole seemed to be effective for treatment based on a limited number of case reports and our own experience.

It is difficult to discern how the patient acquired the organism. She did not report any unusual animal or food exposure, nor had the patient had any recent travel. She was not on immunosuppressive agents and had no significant past medical history. The patient spiked multiple fevers after one week of ampicillin/sulbactam and vancomycin. It is unclear if this was due to treatment failure or drug induced fever. Drug fever seemed conceivable due to a lack of leukocytosis although the patient did become tachycardic during the febrile episode. It is quite clear though, that the first course of antimicrobials of daptomycin and doxycycline were not the right regimen to treat this organism and thus did not clear the infection.

Conclusion

Robinsoniella peoriensis is an emerging human pathogen diagnosed more frequently in recent years primarily due to the utilization of molecular sequencing in clinical microbiology laboratories. This organism may have been under recognized as a human pathogen because traditionally most laboratories would only report it as gram-positive, spore-forming, anaerobic rod without further workup. This organism has been reported to cause serious infections including bacteremia, soft tissue infections, prosthetic joint infections, and in our case, subperiosteal abscess related to hardware implantation in the femur. In most cases, there was no clear epidemiological link to explain where patients acquired this organism, which is typically found in swine manure. However, a recent study reported the isolation of *R. peoriensis* in the stool of healthy premature neonates suggesting humans may be colonized at an early age [9]. The prevalence of colonization remains under further investigation. In most cases, *R. peoriensis* was reported to be susceptible to piperacillin-tazobactam, ertapenem and metronidazole, but resistant to penicillin and clindamycin. In our case, the patient responded well to six weeks of intravenous ertapenem. More studies are necessary to establish a better understanding of this organism's virulence, transmission, and antimicrobial susceptibility patterns.

Conflicts of interest

None of the above authors have competing interests to declare.

Funding

There was no financial support for the conduct of the research or preparation of the article.

References

[1] Rieber H, Frontzek A, Bell A, Frommelt L. Robinsoniella peoriensis, originally isolated from swine manure, and early periprosthetic hip infection: case report and review of the literature. Anaerobe 2016;42(December):33–6.
[2] Gomez E, Gustafson D, Colgrove R. Isolation of *Robinsoniella peoriensis* from four human specimens. J Clin Microbiol 2011(January):458–60.
[3] Whitehead T, Anoma C, McLaughlin R. Rapid identification of Robinsoniella peoriensis using specific 16S rRNA gene PCR primers. Anaerobe 2017;43(February):39–42. http://dx.doi.org/10.1016/j.anaerobe.2016.11.008. Epub 2016 Nov 247.
[4] Illiaquer M, Corvic S. Anaerobes isolated from bone and joint infections and their susceptibility to antibiotics. J Infect 2012;65:473e475.
[5] Jeon Y, Kim TS, Kim HB, Park KU, Song J, Kim EC. First Korean case of *Robinsoniella peoriensis* bacteremia in a patient with aspiration pneumonia. Ann Lab Med 2012;32:370e374.
[6] Lopez P, Belda S, Garcia M, Royo G. Infection of a spontaneous muscular hematoma due to Robinsoniella peoriensis, in a patient with alcoholic liver cirrhosis. Enferm Infecc Microbiol Clin 2010;28:565e567.
[7] Cotta MA, Whitehead TR, Zeltwanger R. Isolation, characterization and comparison of bacteria from swine faeces and manure storage pits. Environ Microbiol 2003;5:737e745.
[8] Cassir N, Laget L, Renvoise A, et al. *Robinsoniella perotiensis* infection following surgery for scoliosis: a case report. J Med Case Rep 2012;6:174.
[9] Ferraris L1, Aires J, Butel MJ. Isolation of Robinsoniella peoriensis from the feces of premature neonates. Anaerobe 2012;18(February (1)):172–3. http://dx.doi.org/10.1016/j.anaerobe.2011.11.007. Epub 2011 Dec 3.