An unusual case of Staphylococcus pasteuri osteomyelitis

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Abstract

Staphylococcus pasteuri is a gram-positive organism found in food products as well as naturally occurring in air and on surfaces. We present the first known case of Staphylococcus pasteuri osteomyelitis caused by machine injection injury. The patient was treated with emergent surgical debridement as well as doxycycline for a soft tissue infection. Despite targeted therapy, the infection progressed to osteomyelitis and was treated successfully with additional surgical debridement and trimethoprim-sulfamethoxazole. There is sparse information on both infections and treatment of Staphylococcus pasteuri. We present our case report as well as a review of the literature on the epidemiology, susceptibility and treatment recommendations for Staphylococcus pasteuri infections.

Case Report

Our patient is a 24-year-old male with no past medical history who presented with a penetrating thumb wound. The patient works at a factory where he fills vaping cartridges with cannabidiol oil and additives. A machine cartridge injection needle punctured his right thumb at the nail base and oil and additives were introduced under pressure into the digit. Over the next several hours, he experienced increasing pain, swelling and erythema in his thumb prompting him to seek medical attention in the emergency department (Figure 1).

The patient underwent emergent surgery to incise and drain the dorsal and volar surfaces of his thumb, including the interphalangeal joint and the flexor tendon sheath. A light-colored, oily appearing fluid was encountered in the pulp tissue and extended proximally around the flexor tendon sheath. A second surgical debridement procedure was completed the following day. Tissue cultures grew gram-positive cocci and the patient was started on IV vancomycin while hospitalized. The organism was subsequently identified as Staphylococcus pasteuri. Susceptibilities were identified using the VITEK 2 automated diagnostic machine (Biomerieux, Durham, NC); of note, the organism was pan-susceptible to the antibiotics tested which include clindamycin 0.25 μg/mL, erythromycin ≤0.25 μg/mL, gentamicin ≤0.5 μg/mL, linezolid 2 μg/mL, oxacillin ≤0.25 μg/mL, rifampin ≤0.5 μg/mL, tetracycline ≤1 μg/mL, trimethoprim/sulfamethoxazole ≤0.5/9.5 μg/mL, and vancomycin 1 μg/mL). Based on susceptibilities, the patient was discharged on oral doxycycline (100 mg twice daily for two weeks).

Within the first two weeks after hospital discharge, swelling in the thumb worsened and new drainage from the pulp developed. A third surgical debridement procedure was completed 18 days after the injection injury; unfortunately, no cultures were sent to the laboratory from this procedure. The oral doxycycline course was extended for treatment of suspected osteomyelitis (Figure 2).

An MRI of the right thumb was completed and confirmed acute osteomyelitis of the distal phalanx. At this point, the patient declined further surgeries and procedures. He was seen in the infectious disease clinic and switched to oral trimethoprim-sulfamethoxazole (two double-strength tablets twice daily for a six-week course). The patient had resolution of pain and swelling in his thumb at the final evaluation 14 weeks postoperatively. There was improved but incomplete active motion of the interphalangeal joint, diminished soft tissue bulk, and scarring of the nail bed (Figure 3).

Discussion

Staphylococcus pasteuri is a gram-positive, coagulase-negative, nonmotile, yellow-appearing bacterium named in honor of the French microbiologist Louis Pasteur. The species was characterized at Pasteur’s institute The Institut Pasteur in Paris, France.1

The bacterium is not a common skin flora, but rather has been isolated in drinking water2 and a number of foods, including goat milk,1 Italian sausages,2 sea fish,3 and retail beef,3 as well as from indoor airborne bacteria,2 bird eye fluid,2 and stratospheric air samples.3 It can be overrepresented in the gastrointestinal tract in children with active celiac disease4 and can sometimes be found in platelet transfusions10,11 Staphylococcus pasteuri is a rare human pathogen.12-16 Ramnarain et al.12 described a case wherein a patient developed osteomyelitis and endocarditis due to a pan-susceptible Staphylococcus pasteuri that was isolated from blood cultures using mass spectrometry.13 The patient underwent aortic valve surgery and received a 12-week course of intravenous penicillin with full recovery. Savini et al.16 reported one patient with acute myeloid leukemia who developed fevers and bone pain and was found to have Staphylococcus pasteuri bacteria that was resistant to penicillin and oxacillin. Treatment was successful with piperacillin-tazobactam and teicoplanin. Morfin-Otero et al.15 described a patient with cervical cancer who developed dysuria after Foley catheter placement while undergoing chemotherapy. A urine culture grew Staphylococcus pasteuri: unfortunately, antibiotic sensitivities and treatment were
not reported. Our patient was prescribed oral doxycycline after an initial short course of intravenous vancomycin. He experienced progression of the thumb infection while taking doxycycline. We are uncertain if clinical failure was a result of medication failure or source control. The infection resolved after a third surgical debridement procedure and a six-week course of oral trimethoprim-sulfamethoxazole. Surgical management of hand infections and typical pathogens of hand osteomyelitis are discussed elsewhere.17,18

To our knowledge, Staphylococcus pasteuri has not previously been documented as a cause of isolated joint infection or osteomyelitis. The bacterium has been infrequently cultured from periprosthetic tissues and has been considered a contaminant in those cases.16 Based on case reports of bacteria isolated from air samples, it is most likely that the machine injection needle was colonized with *Staphylococcus pasteuri*. The bacterium is susceptible to a broad range of antibiotics; however, it is generally resistant to penicillin with the mechanism underlying resistance uncertain.16

Conclusions

*Staphylococcus pasteuri* is a gram-positive organism found in food products as well as naturally occurring in air and on surfaces. It is a rare cause of human disease. We present the first known case of *Staphylococcus pasteuri* osteomyelitis caused by workplace injury treated with prolonged courses of oral antibiotics and surgical debridement. As the pathogen has likely low virulence, clinicians should consider the clinical circumstances for the cause of *Staphylococcus pasteuri* infection. We recommend targeted antibiotic therapy whenever possible.

References

1. Chesneau O, Morvan A, Grimont F, et al. Staphylococcus pasteuri sp. nov., isolated from human, animal, and food specimens. Int J Syst Bacteriol 1993;43:237-44.
2. Faria C, Vaz-Moreira I, Serapicos E, et al. Antibiotic resistance in coagulase-negative staphylococci isolated from wastewater and drinking water. Sci Total Environ 2009;407:3876-82.
3. Rantsiou K, Iacumin L, Cantoni C, et al. Ecology and characterization by molecular methods of Staphylococcus species isolated from fresh sausages. Int J Food Microbiol 2005;97:277-84.
4. Regecova I, Pipova M, Jevinova P, et al. Species identification and antimicrobial resistance of coagulase-negative staphylococci isolated from the meat of sea fish. J Food Sci 2014;79:M898-902.
5. Bhargava K, Zhang Y. Characterization of methicillin-resistant coagulase-negative staphylococci (MRCoNS) in retail meat. Food Microbiol 2014;42:56-60.
6. Madsen AM, Mosleh-Jenabian S, Islam MZ, et al. Concentrations of Staphylococcus species in indoor air associated with other bacteria, season, relative humidity, air change rate, and S. aureus-positive occupants. Environ Res 2018;160:282-91.
7. Bezzian M, Bezzian M. American kestrel (Falco sparverius) fledgling with severe bilateral peri-orbital swelling and infection with Mycoplasma buteonis, Avibacterium (Pasteurella) gallinarum, and Staphylococcus pasteuri. J Avian Med Surg 2014;28:127-31.
8. Wainwright M, Wickramasinghe NC, Narlikar JV, et al. Microorganisms cultured from stratospheric air samples obtained at 41 km. FEMS Microbiol Lett 2003;218:161-5.
9. Sanchez E, Donat E, Ribes-Koninckx C, et al. Duodenal-mucosal bacteria associated with celiac disease in children. Appl Environ Microbiol 2013;79:5472-9.
10. Savini V, Bianco A, Catavitiello C, et al. Meticillin-heteroresistant Staphylococcus pasteuri from an apheresis platelet product. J Med Microbiol 2009;58:...
1527-8.
11. Savini V, Catavitello C, Pompetti F, et al. Contamination of a donated platelet unit by Staphylococcus pasteuri. J Infect 2008;57:494-6.
12. Ramnarain J, Yoon J, Runnegar N. Staphylococcus pasteuri infective endocarditis: A case report. IDCases 2019;18:e00656.
13. Petti CA, Simmon KE, Miro JM, et al. Genotypic diversity of coagulase-negative staphylococci causing endocarditis: a global perspective. J Clin Microbiol 2008;46:1780-4.
14. Savini V, Catavitello C, Carlino D, et al. Staphylococcus pasteuri bacteraemia in a patient with leukaemia. J Clin Pathol 2009;62:957-8.
15. Morfin-Otero R, Martinez-Vazquez MA, Lopez D, et al. Isolation of rare coagulase-negative isolates in immuno-compromised patients: Staphylococcus gallinarum, Staphylococcus pettenkoferi and Staphylococcus pasteuri. Ann Clin Lab Sci 2012;42:182-5.
16. Savini V, Catavitello C, Bianco A, et al. Epidemiology, pathogenicity and emerging resistances in Staphylococcus pasteuri: from mammals and lampreys, to man. Recent Pat Antiinfect Drug Discov 2009;4:123-9.
17. Honda H, McDonald JR. Current recommendations in the management of osteomyelitis of the hand and wrist. J Hand Surg Am 2009;34:1135-6.
18. Koshy JC, Bell B. Hand Infections. J Hand Surg Am 2019;44:46-54.