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Case report

Acinetobacter radioresistens and *Enterococcus casseliflavus* co-infection with endocarditis, bacteremia, and pneumonia

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ABSTRACT

Acinetobacter species are Gram-negative coccobacilli found to cause a multitude of infections. However, they are a rare cause of bacteremia with Acinetobacter radioresistens accounting for less than 10 % of Acinetobacter infections. In this report, we describe a patient presenting with acute encephalopathy, fever, and hypoxia who was initially found to have bilateral perihilar and lower lobar peribronchial thickening on chest x-ray. Two sets of blood cultures obtained on admission were positive for *Acinetobacter radioresistens* and *Enterococcus casseliflavus* and one set of blood cultures returned positive for *Leclercia adecarboxylata* although believed to be a skin contaminant. Susceptibilities confirmed all bacteria were pan-sensitive. The patient was also found to have an aortic valve vegetation which was not amenable to surgical intervention. He was treated with 42 days of daptomycin and cefepime. At present, co-infection with *Acinetobacter radioresistens* and *Enterococcus casseliflavus* with manifestations of polymicrobial endocarditis has never been reported. Though this co-infection was pan-sensitive, there is an increasing rate of resistance to commonly used, broad-spectrum antibiotics such as β-lactams, which will continue to pose a challenge between balancing treatment and antibiotic stewardship.

Introduction

Acinetobacter species are strictly aerobic, Gram-negative, catalase-positive, oxidase-negative, non-spore-forming, non-motile pleomorphic coccobacilli commonly associated with ventilator-associated pneumonia, skin and soft-tissue infections, urinary tract infections, peritonitis, and secondary meningitis [1]. However, Acinetobacter species account for 1–2 % of all documented bloodstream infections [1]. Among this species, *Acinetobacter radioresistens* accounts for approximately 10 % of all Acinetobacter infections [2]. While there are documented incidences of *Acinetobacter radioresistens* causing bacteremia, to our knowledge, there are no reports of either polymicrobial bacteremia or endocarditis involved with *Acinetobacter radioresistens*. In this report, we present a case of bacteremia, pneumonia, and endocarditis secondary to *Acinetobacter radioresistens* and *Enterococcus casseliflavus* infections.

Case presentation

A 63-year-old male was brought to the hospital due to decreased responsiveness while at a nearby homeless shelter. He had a past medical history of cirrhosis, alcohol use disorder, COPD, homelessness, and an unspecified seizure disorder. On physical exam, the patient was normotensive but febrile at 100.9 °F, tachycardic at 135 beats per minute, and hypoxic at 89 % on room air. He was somnolent but arousable to voice. Oral examination evinced poor dentition. He had coarse breath sounds with rales in bilateral lung bases. Notable initial laboratory findings included WBC of 5.3×10^3/uL, platelets 77 10^3/uL, AST 193 U/L, ALT 72 U/L, and lactic acid of 3.9 mmol/L. A chest x-ray revealed moderate perihilar and lower lobe peribronchial thickening with ground-glass opacities (Fig. 1). The patient was admitted to the medical floor and was treated for sepsis secondary to pneumonia with vancomycin 1250 mg IV and cefepime 2 g IV every 12 h.

Blood cultures obtained on admission returned positive with Gram negative bacilli and Gram-positive cocci in pairs and chains under the Phoenix microbiology system growing in two sets. After two days, the Gram-negative bacilli was identified as *Acinetobacter radioresistens* and the Gram-positive cocci in pairs and chains was identified as Enterococcus species. At day three, the Enterococcus was identified as *Enterococcus casseliflavus*. Susceptibilities were obtained using Phoenix microbiology system and found *Acinetobacter radioresistens* to be

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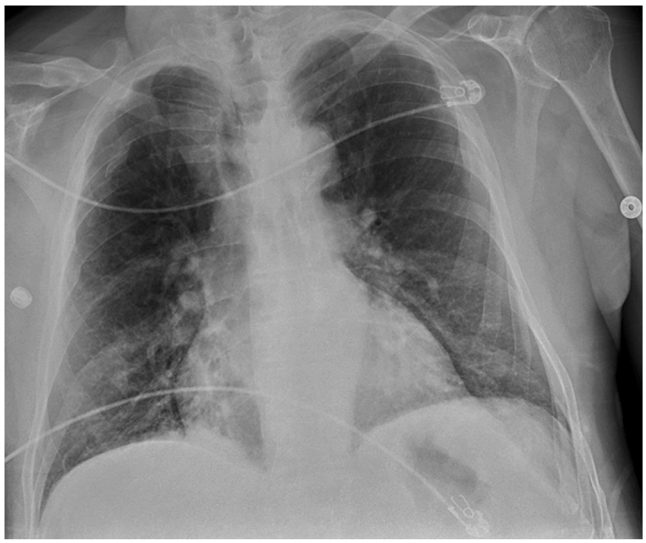

Fig. 1. AP chest radiograph obtained on admission depicting moderate perihilar and lower lobe peribronchial thickening with ground-glass opacities.

susceptible to ampicillin/sulbactam (MIC < 1/0.5 μg/mL), cefepime (MIC < 1 μg/mL), ciprofloxacin (MIC < 0.25 μg/mL), gentamicin (MIC < 2 μg/mL), tobramycin (MIC < 2 μg/mL), and trimethoprim/sulfamethoxazole (MIC < 0.5/9.5 μg/mL). Susceptibilities for *Enterococcus casseliflavus* using the same method were found to be susceptible to ampicillin (MIC = 1 μg/mL), daptomycin (MIC = 4 μg/mL), linezolid (MIC = 2 μg/mL), and penicillin (MIC = 8 μg/mL). Based on the species, there was notably presumed resistance to vancomycin.

One set of blood cultures grew Gram-positive bacilli identified initially as Bacillus species and was subsequently found to be *Leclercia adecarboxylata*. This was believed to be a skin contaminant by the performing laboratory, though nonetheless susceptibilities were obtained using the Kirby-Bauer method and found to be susceptible to ampicillin/sulbactam (MIC = 21 μg/mL), cefazolin (MIC = 21 μg/mL), ceftriaxone (MIC = 30 μg/mL), cefepime (MIC = 30 μg/mL), aztreonam (MIC = 30 μg/mL), meropenem (MIC = 27 μg/mL), gentamicin (MIC = 20 μg/mL), tobramycin (MIC = 20 μg/mL), ciprofloxacin (MIC = 34 μg/mL), and trimethoprim/sulfamethoxazole (MIC = 30 μg/mL). Vancomycin was switched to daptomycin 800 mg IV every 24 h due to *Enterococcus casseliflavus*'s intrinsic resistance to vancomycin. He remained on the same regimen of cefepime.

Additional work up was performed with a transthoracic echocardiogram which poorly visualized the patient's aortic valve and required transesophageal echocardiogram (TEE). TEE confirmed the presence of an aortic valve vegetation measuring 8 mm × 10 mm (Fig. 2). The patient was evaluated by cardiothoracic surgery and was not deemed to be a proper surgical candidate and was treated conservatively with intravenous antibiotics. Repeat blood cultures obtained three days after starting antibiotics showed no growth after five days. The patient then remained in the hospital to complete 42 days of daptomycin and cefepime after negative blood cultures.

Discussion

Based on available data, *Acinetobacter radioresistens* is an exceedingly rare pathogen responsible for bacteremia with only few cases reported [2]. This is a bacterium of concern due to its potential to confer resistance to carbapenems [3]. The potential ramifications of this are concerning as Acinetobacter was identified as the causative bacteria for 8500 infections in hospitalized patients and an estimated 700 deaths in the U.S. in the year 2017 [4].

Interestingly, *A. radioresistens* has also been mistaken as a Gram-positive cocci in pairs and chains due to its ability to resist decolorization in the Gram staining process [1]. Although our patient was also found to have positive blood cultures with both Gram-negative bacilli and Gram-positive cocci in pairs and chains, the second bacteria was eventually identified as *Enterococcus casseliflavus. Enterococcus casseliflavus* is also a rare non-motile, facultative anaerobic Gram-positive coccus occurring in single, pairs, or chains with low-level intrinsic resistance to vancomycin commonly found in the soil, plants, and within the gastrointestinal tract [5,6].

With respect to bacteremia, *Acinetobacter* is associated with a mortality ranging between 20 % and 60 % [6,7]. Infective endocarditis is a rare manifestation of *Acinetobacter* bacteremia but can present in both native and prosthetic valves [8]. There is an association with higher mortality when native valves are implicated rather than prosthetic valves, and this is believed to be secondary both to the aggressive nature of *Acinetobacter* infections and to delays in diagnosis and appropriate treatment when there is a lower index of suspicion [8]. A systematic

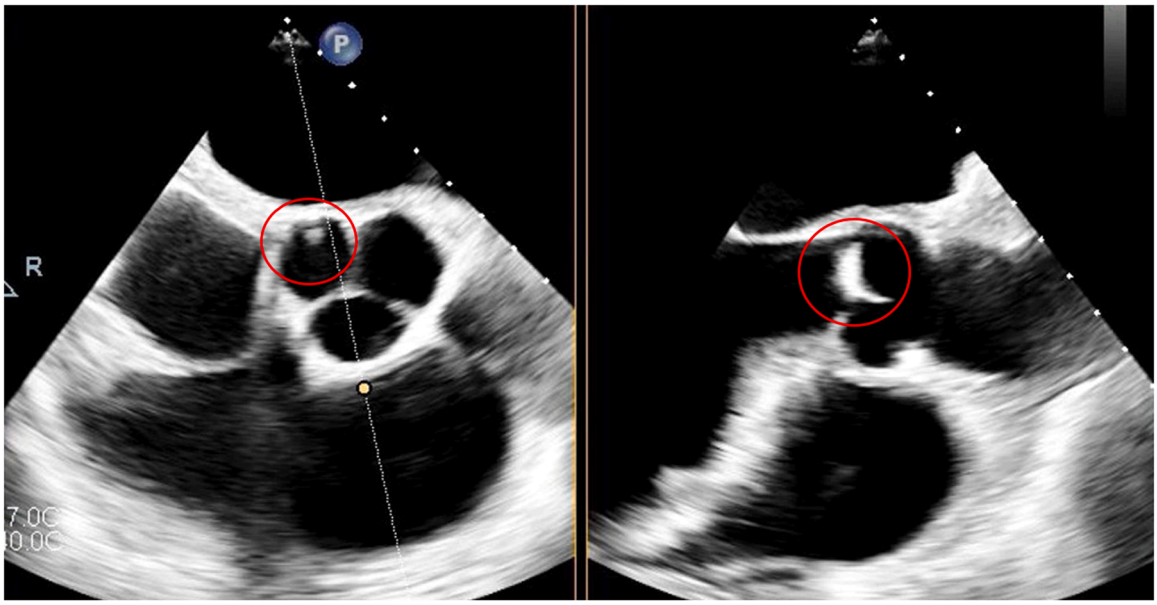

Fig. 2. TEE depicting aortic valve vegetation measuring 8 mm × 10 mm, circled in red.

review of infective endocarditis caused by *Acinetobacter* species also found that among native valves, the aortic valve was the most implicated site followed by the mitral valve [7]. The added concern for antibiotic resistance, especially with *Acinetobacter radioresistens,* makes early identification and treatment of an infective endocarditis imperative.

The presumed contaminant specimen, *Leclercia adecarboxylata,* is a rare motile, aerobic Gram-negative bacillus part of the *Enterobacteriaceae* family commonly found in waters, some animals, and the gastrointestinal tract [9,10]. Pathogenicity has been reported as an opportunistic infection commonly manifesting as cellulitis with rare cases of peritonitis and bacteremia in immunocompromised patients [9, 10]. Although only one blood culture obtained was positive for this, our patient was likely exposed to contaminated water by extension of his socioeconomic status which led to it being treated as a presumed contaminant. Nonetheless, he received antibiotics that would treat *Leclercia adecarboxylata* infection regardless.

Conclusion

Acinetobacter radioresistens is a rare cause of bacteremia and has not yet been implicated as a culprit organism in infective endocarditis. Given that this is the first known case of polymicrobial bacteremia and endocarditis involving these pathogens, *A. radioresistens* should be included in consideration for pathogens responsible for endocarditis. If identified in blood cultures, susceptibilities should be immediately performed to assess for resistance, specifically to antibiotics within the carbapenem class. Subsequent work-up should include a transthoracic and/or transesophageal echocardiogram to rule out or identify the presence of a vegetation given the aggressive and fatal nature of *Acinetobacter* infective endocarditis.

CRediT authorship contribution statement

Ian Motie: Conceptualization, Writing – original draft, Writing – review & editing. **Katherine Burns:** Writing – review & editing, Visualization. **Ryan Thompson:** Investigation. **Elora Friar:** Data curation. **Isabella Bermingham:** Data curation. **Upali Ranasinghe:** Writing – review & editing. **Wilhelmine Wiese-Rometsch:** Supervision, Writing – review & editing, Project administration.

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Ethical approval

N/A.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Conflicts of interest

No conflicts of interest to disclose.

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The authors have no conflicts of interest to disclose.

References

[1] Phillips M. Acinetobacter species. Mandell, Douglas, and Bennett's principles and practice of infectious diseases; 2015. ⟨https://doi.org/10.1016/b978-1-4557-4801-3.00224-1⟩.
[2] Wang T, Costa V, Jenkins SG, Hartman BJ, Westblade LF. Acinetobacter radioresistens infection with bacteremia and pneumonia. IDCases 2019;15:e00495. https://doi.org/10.1016/j.idcr.2019.e00495 [Published 2019 Jan 28].
[3] Poirel L, Figueiredo S, Cattoir V, Carattoli A, Nordmann P. Acinetobacter radioresistens as a silent source of carbapenem resistance for Acinetobacter spp. Antimicrob Agents Chemother 2008;52(4):1252–6. https://doi.org/10.1128/AAC.01304-07.
[4] Carbapenem-Resistant Acinetobacter. Centers for Disease Control and Prevention. ⟨https://www.cdc.gov/drugresistance/pdf/threats-report/acinetobacter-508.pdf⟩. [Accessed 10 July 2022].
[5] Giraffa G. Enterococcus. Encyclopedia of food microbiology; 2014, p. 674–9. ⟨https://doi.org/10.1016/b978-0-12-384730-0.00098-7⟩.
[6] Verma R, Baroco AL. Enterococcus casseliflavus septicaemia associated with hepatobiliary infection in a 75-year-old man. BMJ Case Rep 2017;2017:bcr2017219636. https://doi.org/10.1136/bcr-2017-219636 [Published 2017 May 12].
[7] Ioannou P, Mavrikaki V, Kofteridis DP. Infective endocarditis by Acinetobacter species: a systematic review. J Chemother 2020;33(4):203–15. https://doi.org/10.1080/1120009X.2020.1812804.
[8] Gradon JD, Chapnick EK, Lutwick LI. Infective endocarditis of a native valve due to Acinetobacter: case report and review. Clin Infect Dis 1992;14(5):1145–8. https://doi.org/10.1093/clinids/14.5.1145.
[9] Anuradha M. Leclercia adecarboxylata isolation: case reports and review. J Clin Diagn Res 2014;(12):DD03–4. https://doi.org/10.7860/JCDR/2014/9763.5260 [Epub 2014 Dec 5. PMID: 25653951; PMCID: PMC4316257].
[10] Keyes J, Johnson EP, Epelman M, Cadilla A, Ali S. Leclercia adecarboxylata: an emerging pathogen among pediatric infections. Cureus 2020;12(5):e8049. https://doi.org/10.7759/cureus.8049 [PMID: 32537268; PMCID: PMC7286590].