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Case report

A case of *Lactobacillus jensenii* associated native valve endocarditis

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ABSTRACT

Lactobacillus jensenii is rarely reported as a cause of endocarditis in immunocompetent patients. We describe a case of *Lactobacillus jensenii* associated native valve endocarditis that was identified using matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF) technology. While most *Lactobacillus* species are generally resistant to vancomycin, *Lactobacillus jensenii* is frequently susceptible, but treatment requires accurate susceptibility results followed by timely medical and surgical intervention. Probiotic use in patients can be a risk factor for infection with *Lactobacillus* species.

Introduction

Lactobacillus jensenii is a gram positive, non-spore forming rod-shaped facultative anaerobic bacteria. Infective endocarditis caused by *L. jensenii* in immunocompetent patients is an uncommonly reported disease [1]. Historically, *Lactobacillus* species were considered intrinsically resistant to vancomycin. *L. jensenii* is an organism that presents with variable vancomycin resistance [2]. Optimal clinical management requires microbiological diagnosis and susceptibility testing using molecular genetic analysis or matrix assisted laser desorption/ionization-time of flight (MALDI-TOF) technology, neither of which is routinely performed in many clinical microbiology laboratories [3]. Successful treatment of endocarditis caused by this organism requires both medical and timely surgical intervention. The clinical impact of probiotic use with high concentrations of *Lactobacillus* bears vigilance in at-risk hosts.

Case presentation

A 22-year-old female of Chinese origin presented to the emergency room with worsening chest tightness, palpitation, dyspnea, chills, night sweats, and bilateral leg swelling for one month. She was evaluated by her primary care provider prior to presentation who performed an in-office echocardiogram and noted a finding concerning for possible vegetation. He sent her to the emergency room for further evaluation and management. Her medical history included ligation of a patent ductus arteriosus via left thoracotomy at age two while in China. She reported chronic constipation which improved over the past year after she added yogurt high in probiotics to her diet. She had no other significant medical or social history.

Upon physical examination she was noted to be afebrile, to have good dentition, a skin exam without petechiae or peripheral signs of septic emboli, and a healed surgical scar on the left posterolateral thorax. Her cardiac examination was significant for a holosystolic murmur at the mitral region with radiation to the axilla. Her lower extremities were noted to have bilateral non-pitting edema to mid-leg. Initial lab results demonstrated: white blood cell count 10.1 k/μL, neutrophils 71%, hemoglobin 11.4 g/dL, MCV 85 fL, RDW 12.6%, platelet 217 k/μL. Electrolytes and urinalysis were all within normal limits. Chest radiograph and computerized tomography of the chest with intravenous contrast were both unremarkable. The medical team was alerted by the microbiology laboratory regarding bacterial growth in all six blood

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culture bottles within 27 h of being obtained. Gram stain demonstrated Gram variable rods with further identification pending. Patient received broad empiric antimicrobial therapy consisting of vancomycin and meropenem.

Clinical course

Transthoracic echocardiogram demonstrated a myxomatous anterior mitral leaflet with doming and prolapse. Transesophageal echocardiogram demonstrated an independently mobile "shaggy looking" echodensity measuring 1.5 cm by 0.82 cm attached to the distal portion of the A3 scallop of the mitral valve which was associated with severe mitral regurgitation (Fig. 1). Following detailed multidisciplinary discussion with the patient and her family, she underwent mitral valve replacement on day four of hospitalization. Intra-operatively the anterior mitral leaflet was extensively damaged and there was a 2 cm vegetation loosely attached to the anterior leaflet which was excised along with the anterior leaflet. Mitral valve leaflets were sent for pathology and microbiologic analysis. A 27 mm St. Jude's mechanical mitral valve was placed in accordance with extensive pre-operative discussions of the options with the patient, her family, cardiologists, and cardiothoracic surgeons. The patient did well postoperatively, initiated warfarin, and was discharged home on post operative day 10 to complete a six-week course of intravenous ertapenem (chosen by patient and family to optimize convenience of administration). Following discharge, the patient underwent computed tomography of the abdomen and pelvis that did not demonstrate any pathology and colonoscopy which was unremarkable – workup that was recommended by the infectious diseases team to determine a source for the lactobacillemia.

Microbiology

The Gram variable rods were identified to be members of the *Lactobacillus* genus four days after obtaining the initial blood cultures. *Lactobacillus* species final identification as *Lactobacillus jensenii* occurred four weeks after blood cultures were obtained using matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF). Repeat blood cultures obtained five days after initial positive blood cultures while receiving effective antimicrobial therapy demonstrated no growth. Microbiologic analysis of the excised valve also demonstrated *Lactobacillus jensenii* (Fig. 2a-d).

Discussion

Lactobacillus jensenii is a gram-positive, non-spore forming, rod-shaped, facultative anaerobic bacteria [4]. Classically considered a normal inhabitant of the gastrointestinal and genitourinary tract of healthy women, opportunistic infections have been observed such as abdominal abscesses, pyelonephritis, meningitis, pneumonia, and less commonly endocarditis [6,7]. Its presence in the gastrointestinal tract of women is associated with decreased rates of sexually transmitted infections (i.e., bacterial vaginosis, *Neisseria gonorrhea*, HIV, and pelvic inflammatory disease) [5]. The *Lactobacillus* genus is estimated to be responsible for 0.05–0.4% of all infective endocarditis cases with a reported mortality of 30% [8]. Risk factors for disseminated *Lactobacillus* infections include congenital heart disease and/or prosthetic valves, continuous peritoneal dialysis, immunosuppression (e.g., poorly controlled diabetes mellitus, malignancy, transplant, etc.), recent genitourinary instrumentation, and poor dental hygiene [9] among others. Approximately three-quarter of cases of *Lactobacillus* associated endocarditis occur in the setting of dental manipulation, and less commonly due to gastrointestinal or genitourinary procedures [10].

Lactobacillus is commonly seen as an additive in many yogurts, fermented foods, and probiotics marketed to maintain health and prevent illness [11]. Pathogenesis is related to the bacteria's ability to produce enzymes that break down human glycoproteins allowing for early colonization, adherence, and biofilm formation, ultimately leading to bacterial translocation across the gut mucosa [12,13] Literature review revealed multiple reported cases of *Lactobacillus* endocarditis, but only six cases of infective endocarditis attributed to *Lactobacillus jensenii* as the primary pathogen [1,14–18].

Lactobacilli may be difficult to culture and require specific media for optimal results. Accurate identification of *Lactobacillus* to the species level requires molecular analysis of the 16 S rRNA gene [19]. In our case MALDI-TOF technology was used. Susceptibility to antimicrobial agents is species dependent. All *Lactobacillus* species tested demonstrated susceptibility to imipenem and piperacillin-tazobactam (but not uniformly to penicillin). The vast majority of *Lactobacillus* species are reported to be intrinsically resistant to vancomycin, however many (but not all) *L. jensenii* are susceptible to vancomycin.

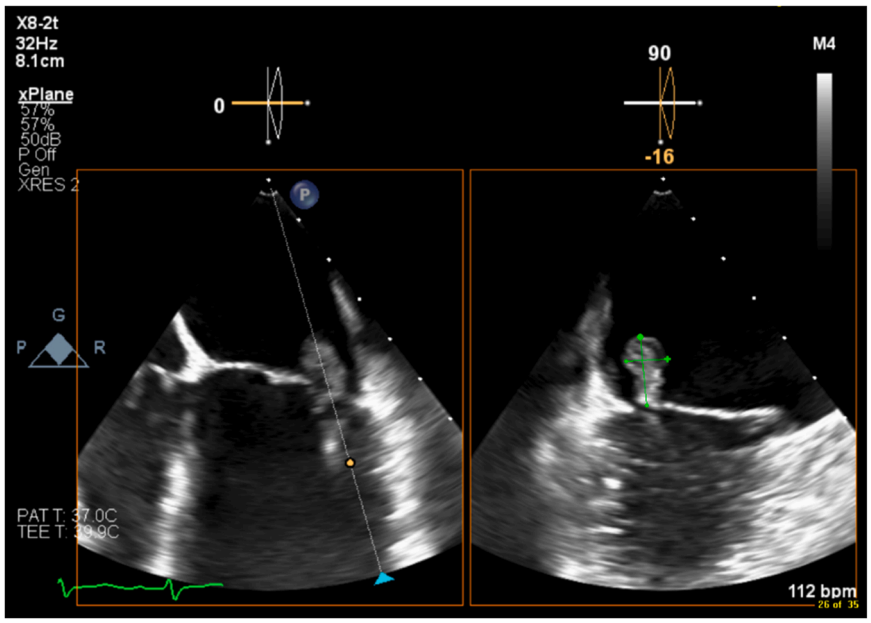

Fig. 1. Echocardiogram with view of mitral valve and vegetation.

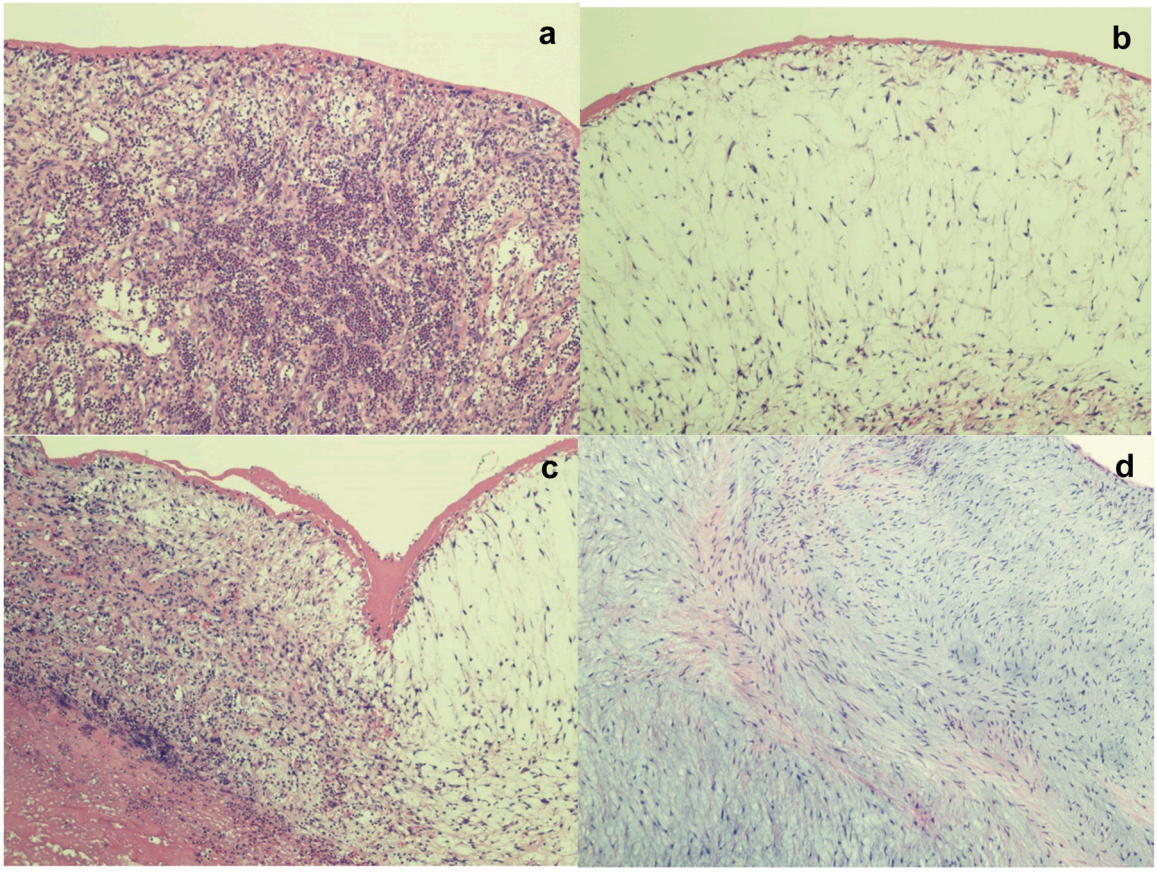

Fig. 2. (a): Granulation tissue with diffuse neutrophilic infiltrates. H&E, 10x. (b) Area of marked myxoid degeneration. H&E, 10x (c) Myxoid area at the right adjacent to area of mixed inflammation, fibrin, and bacterial colonization at the low left. H&E, 10x. (d) same area of 10x magnification. H&E.

Treatment of *Lactobacillus* infections poses challenges as the bacillus can build tolerance against antibiotics as well as its ability to produce lactic acid with generation of an acidic environment that reduces bactericidal activity of beta-lactams and aminoglycosides. The most commonly identified resistance genes are tet(M), tet(W), ermB and ermG. Jeters et al., assessed the presence of antibiotic resistance in the vaginal microbiota in two populations of primates never exposed to antibiotics, both which demonstrated high prevalence of tet(M) and tet (W) genes [20–23]. Florez et al. evaluated the erm(B) gene, found in many gram-positive bacteria, encoding erythromycin and clindamycin resistance isolated from *L. johnsonii*.

Preferred treatment of lactobacillemia is with beta-lactams and aminoglycosides [24,25]. Most patients in case reports received two-drug regimens consisting of penicillin and gentamicin for a duration of 6 weeks however other antibiotics can be administered based on susceptibility testing. For patients with vancomycin resistance, clindamycin can be substituted in those with penicillin allergies. Valvular surgery is often recommended in the treatment of *Lactobacillus* endocarditis with severe valvular damage. The decision to treat our patient with ertapenem was based on accurate identification of *Lactobacillus* at the species level and antimicrobial susceptibility as well as considerations for toxicity and ease of administration. Guidelines for management of *Lactobacillus* infective endocarditis are needed.

Our patient had underlying repaired congenital heart disease based on her prior surgical history which increased her risk for endocarditis. Her significant increased intake of probiotic containing yogurt in the setting of chronic constipation may have increased her risk for colonization and transmural migration leading to lactobacillemia (despite having an unremarkable colonoscopy during her medical workup). Probiotics are rich sources of *Lactobacillus* species and have the potential to lead to lactobacillemia when ingested by certain hosts [9]. Although they are marketed extensively to be safe, caution needs to be exercised in their use.

Conclusion

L. jensenii is found in many products available for human consumption including fermented foods, probiotics and supplements and are suggested to be safe. Cases of lactobacillemia have been reported. Identification and susceptibility testing are not always readily available to help guide therapy. We present a case of *Lactobacillus* infective endocarditis requiring surgical intervention in the setting of prior structural cardiac disease and high-probiotic content yogurt intake. We stress the importance of combined medical and surgical management of these cases as well as public education of the potential risks surrounding probiotic intake.

Author agreement

All authors have agreed for authorship, read and approved the manuscript, and given consent for publication of the manuscript.

Ethical approval

All authors have agreed for authorship, read andapproved the manuscript, and given consent for publication of the manuscript.

Consent

Consent to publish was not obtained since the case report does not contain any personal identifiers.

CRediT authorship contribution statement

Monica Bapna: Participated in the diagnostic process, data collection, and writing of the manuscript. **Jaslyn Maurer:** Participated in the writing, editing and review of the manuscript **Samantha Ruddy:** Participated in the diagnostic process and data collection. **Krupa Karnik:** Participated in the diagnostic process and data collection. **Glenn Turett:** Participated in the diagnostic process, review and editing of the manuscript. **Carl Urban:** Participated in the writing, review and editing of the manuscript. **James Yoon:** Participated in the diagnostic process, review and editing of the manuscript. **Nishant Prasad:** Participated in the diagnostic process, review and editing of the manuscript. **Lok Yung:** Participated in the diagnostic process, review and editing of the manuscript. **Samuel Lang:** Participated in the diagnostic process, review and editing of the manuscript. **Charles Mack:** Participated in the diagnostic process, review and editing of the manuscript. **Alexander Volodarsky:** Participated in the diagnostic process, review and editing of the manuscript. **Sergei Aksenov:** Participated in the diagnostic process and review of the manuscript. **Sorana Segal-Maurer:** Participated in the writing, review and editing of the manuscript.

Declaration of Competing Interest

All authors report no potential conflicts of interest

References

[1] Grazioli-Gauthier L, Rigamonti E, Leo LA, Lucchini GM, Priore EL, Bernasconi E. *Lactobacillus jensenii* mitral valve endocarditis: case report, literature review and new perspective. ID cases 2022;27:e01401.

[2] Campedelli I, Mathur H, Salvetti E, Clarke S, Rea MC, Torriani S, et al. Genus-wide assessment of antibiotic resistance in *Lactobacillus* spp. Appl Environ Microbiol 2018;85(1):e01738–18. 13.

[3] Oviaño M, Bou G. Matrix-assisted laser desorption ionization-time of flight mass spectrometry for the rapid detection of antimicrobial resistance mechanisms and beyond. Clin Microbiol Rev 2018;32(1):e00037–18. 28.

[4] Aguirre M, Collins MD. Lactic acid bacteria and human clinical infection. J Appl Bacteriol 1993;75:95–107.

[5] Ravel J, Gajer P, Abdo Z, Schneider GM, Koenig SS, McCulle SL, et al. Vaginal microbiome of reproductive-age women. Proc Natl Acad Sci 2011;108(Suppl 1): 4680–7 (Suppl 1).

[6] Mohan A, Rubin J, Chauhan P, Ramirez JL, Giese G. Renal and perinephric abscesses involving *Lactobacillus jensenii* and *Prevotella bivia* in a young woman following ureteral stent procedure. J Community Hosp Intern Med Perspect 2020; 10(2):162–5.

[7] Cannon JP, Lee TA, Bolanos JT, Danziger LH. Pathogenic relevance of *Lactobacillus*: a retrospective review of over 200 cases. Eur J Clin Microbiol Infect Dis 2005;24 (1):31–40.

[8] Glasser F. Safety of lactic-acid bacteria and their occurrence in human clinical infections. Bull Inst Pasteur 1994;92:45–67.

[9] Borriello SP, Hammes WP, Holzapfel W, Marteau P, Schrezenmeir J, Vaara M, et al. Safety of probiotics that contain lactobacilli or bifidobacteria. Clin Infect Dis 2003; 36:775–80.

[10] Sussman JI, Baron EJ, Goldberg SM, Kaplan MH, Pizzarello RA. Clinical manifestations and therapy of *Lactobacillus* endocarditis: report of a case and review of the literature. Rev Infect Dis 1986;8:771–6.

[11] Hill C, Guarner F, Reid G, Gibson GR, Merenstein DJ, Pot B, et al. Expert consensus document: The International Scientific Association for Probiotics and Prebiotics consensus statement on the scope and appropriate use of the term probiotic. Nat Rev Gastroenterol Hepatol 2014;11:506–14.

[12] Rossi F, Amadoro C, Colavita G. Members of the lactobacillus genus complex as opportunistic pathogens: a review. Microorganisms 2019;7(5):1–15.

[13] Snydman DR. The safety of probiotics. Clin Infect Dis 2008;46(Suppl 2):S104–111.

[14] Patnaik S, Davila CD, Chennupati A, Rubin A. Endocarditis of the native aortic valve caused by *Lactobacillus jensenii*. BMJ Case Rep 2015.

[15] Marciniak A, Karapanagiotidis GT, Sarsam M, Sharma R. Postpartum *Lactobacillus jensenii* endocarditis in patient with bicuspid aortic valve. J Thorac Cardiovasc Surg 2014;148(5):e219–21.

[16] Fradiania PA, Petrucca A, Ascenzioni F, Nucci GD, Teggi A, Bilancini S, et al. Endocarditis caused by *Lactobacillus jensenii* in an immunocompentent patient. J Med Microbiol 2010;59:607–9.

[17] Suárez-García I, Sánchez-García A, Soler L, Malmierca E, Gomez-Cerezo J. *Lactobacillus jensenii* bacteremia and endocarditis after dilatation and curettage: case report and literature review. Infection 2011;40(2):219–22.

[18] Minto T, Bullock N, Deglurkar I, Hughes O. Asymptomatic bilateral obstructing ureteric calculi resulting in lactobacillaemia and endocarditis requiring emergency aortic valve replacement. Urol Case Rep 2020;32:101218.

[19] Woo PCY, Fung AMY, Lau SKP, Yuen KY. Identification by 16S rRNA gene sequencing of Lactobacillus salivarius bacteremic cholecystitis. J Clin Microbiol 2002;40:265–7.

[20] Jeters RT, Rivera AJ, Boucek LM, Stumpf RM, Leigh SR, Salyers AA. Antibiotic resistance genes in the vaginal microbiota of primates not normally exposed to antibiotics. Micro Drug Resist 2009;15:309–15.

[21] Miller JH, Novak JT, Knocke WR, Pruden A. survival of antibiotic resistant bacteria and horizontal gene transfer control antibiotic resistance gene content in anaerobic digesters. Front Microbiol 2016;7:263.

[22] Flórez AB, Egervärn M, Danielsen M, Tosi L, Morelli L, Lindgren S, et al. Susceptibility of *Lactobacillus plantarum* strains to six antibiotics and definition of new susceptibility-resistance cutoff values. Micro Drug Resist 2006;12(4):252–6.

[23] Vescovo M, Morelli L, Bottazzi V. Drug resistance plasmids in *Lactobacillus acidophilus* and *Lactobacillus reuteri*. Appl Environ Microbiol 1982;43(1):50–6.

[24] Bayer AS, Chow AW, Morrison JO, Guze LB. Bactericidal synergy between penicillin or ampicillin and aminoglycosides against antibiotic-tolerant lactobacilli. J Antimicrob Agents Chemother 2021;17(3):359–63.

[25] Bayer AS, Chow AW, Concepcion N, Guze LB. Susceptibility of 40 lactobacilli to six antimicrobial agents with broad gram-positive anaerobic spectra. Antimicrob Agents Chemother 1978;14(5):720–2.