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LACTOBACILLUS RHAMNOSUS, A BACTERIUM COMMONLY FOUND IN THE GUT AND USED IN PROBIOTIC SUPPLEMENTS, AS A CAUSE OF ENDOCARDITIS IN A PATIENT WITH A SURGICAL AORTIC VALVE REPLACEMENT AND RECENT DENTAL CLEANING

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ABSTRACT

Lactobacillus rhamnosus endocarditis is a rare but significant complication in patients with mechanical heart valves. We present a case of a 73-year-old male with a mechanical aortic valve who developed endocarditis following a routine dental cleaning, despite receiving standard of care prophylactic antibiotics. Blood cultures confirmed *L. rhamnosus*, and imaging highlighted persistent inflammation around the mechanical valve. Management focused on evolving antibiotic therapy with close routine monitoring. This case underscores the diagnostic challenges and therapeutic complexities of *Lactobacillus*-related endocarditis and highlights the need for heightened vigilance in at-risk populations following invasive procedures. Further research is warranted to optimize management strategies for this uncommon pathogen.

KEYWORDS

Lactobacillus, endocarditis, mechanical aortic valve

LEARNING POINTS

- This case highlights the importance of considering *Lactobacillus* species as potential pathogens in patients with mechanical valves, particularly those with specific risk factors that may promote translocation of this bacterium.
- Early recognition with appropriate workup including blood cultures and imaging, with timely initiation of antibiotic therapy is key to ensuring positive outcomes for patients with *Lactobacillus* endocarditis.
- There remains the need for vigilant follow-up and monitoring in *Lactobacillus* endocarditis to assess for efficacy and complications through the disease course even in the setting of standard of care treatment, including prophylactic antibiotics.

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INTRODUCTION/BACKGROUND

Infective endocarditis is a life-threatening condition characterized by infection of the heart valves or endocardial surface, most often caused by Gram-positive bacteria such as *Staphylococcus aureus* and *Streptococci*. However, *Lactobacillus* species have emerged as rare but significant pathogens in endocarditis, particularly in patients with underlying risk factors, such as diabetes, immunosuppression, central venous devices, recent antibiotic treatment and gastrointestinal procedures[1].

Lactobacillus rhamnosus, a bacterium commonly used in probiotics and found in normal gut flora, is infrequently associated with bacteraemia, and even more rarely associated with endocarditis, with a limited number of cases reported in the literature[2]. The pathogenesis of *Lactobacillus* endocarditis is not well understood, but certain predisposing conditions such as mechanical heart valves, recent dental procedures, and recurrent infections may increase risk of its occurrence[3]. A review suggests that approximately 16% of patients diagnosed with *Lactobacillus* endocarditis have a prosthetic heart valve, and prosthetic heart valves were independently associated with higher mortality with 38.5% mortality for those with a prosthetic valve compared to 13% mortality in those without[3]. Treatment for *Lactobacillus* endocarditis can vary but antimicrobials include aminoglycosides and penicillin are commonly used[3].

CASE DESCRIPTION

In 2024, a 73-year-old male presented to the emergency department with 4 days of fevers and chills, one day of chest pain and dysuria. He described his chest pain as a constant, sharp band around his chest. He had dental cleaning 2 weeks prior to his presentation, for which he received prophylactic antibiotics with oral amoxicillin due to his mechanical valve. His past medical history was notable for coronary artery disease (status post percutaneous coronary intervention), surgical mechanical aortic valve replacement in 2018, Nissen fundoplication, recurrent urinary tract infections, hypertension, and hyperlipidaemia. A mechanical valve was used, compared to a biological valve per patient preference. On presentation, he had a temperature of 40.6°C but otherwise was hemodynamically stable. His physical exam on admission was notable for a systolic murmur present at the right upper sternal border with a well-healed scar located on his sternum from his previous valve replacement surgery. His initial work-up on admission was notable for a normal white blood cell count (7.8 K/µl; reference range: 3.7-10.4 K/µl), thrombocytopenia (platelets 111 K/µl; reference range: 145-439 K/µl), elevated aspartate aminotransferase and alanine aminotransferase (102 and 92 U/l, respectively; reference range:10-50 U/l), elevated alkaline phosphatase (145 U/l; reference range: 40-129 U/l), elevated lactic acid (2.3 mmol/l; reference range: 0.5-2.0 mmol/l) and elevated troponin T (56 ng/l; reference range: ≤22 ng/l). An electrocardiogram (EKG) demonstrated mild sinus tachycardia (ST) depression in the inferolateral leads.

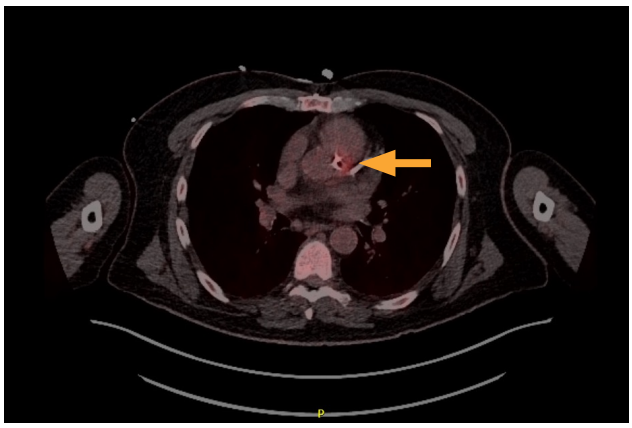


Figure 1. Increased uptake along the inferior left aspect of the mechanical aortic valve demonstrated on fluorodeoxyglucose positron emission tomography scan (arrow).

Acute coronary syndrome was considered as an aetiology of patient's presentation so repeat EKG and trending of troponin T were performed which showed resolution of ST depression and elevated troponin. A computed tomography scan of his abdomen and pelvis demonstrated mild splenomegaly at a diameter of 15.4 cm.

He was admitted to the hospital for further workup of fever of unknown origin and started on 1 g of ceftriaxone for possible urinary tract infection given reported dysuria despite unremarkable urinalysis. On hospital day 2, blood cultures resulted with *Lactobacillus* species and the patient continued to fever to 39°C. Identification of *L. rhamnosus* was determined by matrix-assisted laser desorption/ionization – time of flight (MALDI-TOF) mass spectrometry which is the gold standard in modern laboratories, therefore, it is unlikely we isolated another organism, such as *Erysipelothrix rhusiopathiae*, which has been reported by others[4]. The decision was made to broaden antibiotics to piperacillin and tazobactam 3.375 g every 6 hours while awaiting antibiotic sensitivities and repeat blood cultures were drawn. Per the updated Duke criteria (2023 Duke-International Society for Cardiovascular Infectious Diseases Criteria for Infective Endocarditis) for diagnosing endocarditis, the patient's workup met at least 3 minor criteria including a predisposing cardiac condition (mechanical valve), fever, and microbiological evidence of infection with positive blood cultures thus meeting the classification of definite infective endocarditis[5].

Given the high probability of endocarditis, a transthoracic echocardiogram was obtained which showed an elevated left ventricle outflow tract gradient (mean gradient 4 mmHg increased to 7 mmHg) and elevated valve gradient (mean gradient 17 mmHg increased to 33 mmHg) compared to the patient's previous echo, but no clear vegetation. A subsequent transoesophageal echocardiogram was performed to further characterize the valve abnormality and this demonstrated thickening and reduced motion of the leaflet adjacent to the right coronary sinus of Valsalva. No clear vegetation was observed in either of these images and it was unclear if these findings were due to chronic

Hospital day	Temp mean (°C)	Temp max (°C)	Antibiotics	Imaging
1	39.4	40.6	Ceftriaxone	CT A/P w contrast, chest radiograph
3	37.7	39.3	Piperacillin/tazobactam	US abdomen, CT angiography chest w/ wo contrast, TTE
4	38	38.7	Piperacillin/tazobactam	MRI C/T/L, TEE
5	37	37.4	Ampicillin	-
6	36.1	37.3	Ampicillin	-
7	36.6	36.8	Ampicillin	FDG PET
8	36.7	37.4	Ampicillin/gentamicin	-
9	36.2	36.6	Ampicillin/gentamicin	-
10	36.9	37.2	Ampicillin/gentamicin	Chest radiograph
11	36.7	37.1	Ampicillin/gentamicin	-

Abbreviations: CT A/P, computed tomography scan of the abdomen and pelvis; US, ultrasound; TTE, transthoracic echocardiogram; MRI C/T/L, magnetic resonance imaging of the cervical thoracic and lumbar spine; FDG PET, fluorodeoxyglucose positron emission tomography.

Table 1. Hospital day with associated temperature (mean max), antibiotic regimen, and completed imaging.

changes or were due to an infectious process of the valve, so we pursued further imaging with fludeoxyglucose-18 (FDG) positron emission tomography (PET) which demonstrated increased uptake around the aortic valve replacement, suggestive of infection *(Fig. 1)*.

The patient was ultimately transitioned to ampicillin on hospital day 5 per culture susceptibilities *(Tables 1 and 2)*. Intravenous gentamicin 60 mg daily was started on hospital day 8 due to evidence of synergistic effect with ampicillin. Repeat blood cultures on day 3 and 6 days after admission were negative. The patient was discharged from the hospital to home on hospital day 11 with complete resolution of his fever and chest pain with a plan to continue ampicillin and gentamicin for a 6-week course.

The patient followed up with infectious disease after discharge and completed 6-week course of ampicillin, but gentamicin was terminated after 3 weeks due to worsening renal function. Repeated a FDG PET scan at 5 weeks showed a decrease in uptake and visual conspicuity around the mechanical valve from prior imaging respectively; however, there was persistent uptake on PET imaging concerning for incomplete clearance. He has since been on chronic suppressive amoxicillin 1g TID with repeat PET scan at 4 months showing further decreased uptake. The patient has remained asymptomatic, with no reported fever, chills, or chest pain following his hospital discharge. Given his clinical stability and improvement on his FDG PET scans, surgical intervention was deferred at this time, but thoracic surgery recommended surgical intervention if there was evidence of persistent endocarditis without improvement.

DISCUSSION

Lactobacillus species are normally found in the gut flora and rarely cause infection in humans. However, our report details a patient with a history with a mechanical aortic valve, previous antibiotic therapy, and prior gastrointestinal procedure that increased his risk of developing an infection secondary to *Lactobacillus* bacterium[1]. The likely pathway in which this patient developed a bloodstream infection and infective endocarditis from *L. rhamnosus* was translocation from the oral cavity to the bloodstream after the dental procedure, facilitating transient bacteraemia, which seeded the mechanical valve. The American Heart Association guidelines recommend prophylactic antibiotics, particularly amoxicillin, before dental procedures in patients with mechanical valves, which our patient received[6]. Despite this, bacteraemia and subsequent infective endocarditis developed. A study demonstrated that even following standard amoxicillin prior to dental extraction, 33% of participants had positive blood cultures with endocarditis-related bacteria, with 3 cases of *L. rhamnosus*/case[7]. This highlights that antibiotic prophylaxis, which remains the standard of care for prevention of infective endocarditis in specific high-risk populations, does not eliminate the risk of infective endocarditis[8,9].

The patient was ultimately treated with ampicillin with the

Antibiotic	MIC (µg/ml)	Interpretation
Clindamycin	0.12	Susceptible
Gentamicin	≤2	No interpretation
Penicillin	1	Susceptible
Vancomycin	≥32	Resistant

Abbreviations: MIC, minimum inhibitory concentration.

Table 2. Antibiotic susceptibilities reported from blood culture drawn on hospital day 1.

addition of gentamicin synergistic effects. This combination of ampicillin and gentamicin is supported by the literature and has been shown to be effective in treating *Lactobacillus*-related endocarditis, though data remains limited due to the rarity of such cases[10]. While the indolent nature of *Lactobacillus* can favour a milder course, mechanical valve involvement increases the risk of complications, including persistent infection or the need for surgical intervention. The literature on *Lactobacillus* endocarditis suggests that mortality rates are comparable to those seen with other types of mechanical valve endocarditis (17 vs 10-20%), particularly when diagnosis and appropriate treatment are delayed[1,3]. In our patient's case, even with early diagnosis and proper initiation of treatment, concern for a persistent infection remained. The prognosis of *Lactobacillus* endocarditis can be severe, with mortality rates comparable to other forms of mechanical valve endocarditis, especially if diagnosis and treatment are delayed, illustrating the importance of early therapy with close monitoring of disease progression[11].

This case highlights the importance of considering *Lactobacillus* species as potential pathogens in patients with mechanical valves. Early recognition and treatment with close monitoring are crucial to ensuring successful outcomes and preventing complications and increased mortality associated with this disease, particularly in high-risk patients. Further studies are warranted to develop standardized treatment protocols and improve prognosis in patients with this rare condition.

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