Scholars Journal of Medical Case Reports
Abbreviated Key Title: Sch J Med Case Rep
ISSN 2347-9507 (Print) | ISSN 2347-6559 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Cardiology

A Rare Case of Lactococcus Lactis Endocarditis in Cyanotic Congenital Heart Disease Setting

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DOI: https://doi.org/10.36347/sjmcr.2025.v13i06.003 | **Received:** 16.04.2025 | **Accepted:** 22.05.2025 | **Published:** 03.06.2025

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Abstract **Case Report**

Lactococcus lactis, recognized for its role in dairy culture, is commonly regarded as non-pathogenic and is extensively used in the production of various fermented dairy products. However, rarely documented as a human pathogen, we present a case of bacterial endocarditis attributed to Lactococcus lactis subsp. lactis in patient with a cyanotic congenital heart disease. The case involves a 21-year-old patient with a medical history of NYHA stage II dyspnea, admitted with exacerbated dyspnea, arthralgia, and prolonged fever. Clinical examination revealed significant findings, including a holosystolic murmur, transthoracic echocardiogram showed Atrioventricular discordance and ventriculoarterial discordance with double outlet right ventricle and presence of a vegetation responsible for severe pulmonary insufficiency. Positive anaerobic blood cultures identified Gram-positive cocci with catalase-negative properties and alpha-hemolysis on blood agar, subsequently confirmed as Lactococcus lactis through MALDI-TOF MS analysis. The isolate was sensitive to ampicillin, ceftriaxone, clindamycin, erythromycin, vancomycin, gentamycine and fluoroquinolone. Despite its usual classification as nonpathogenic, this case emphasizes Lactococcus lactis's potential to cause systemic infections, particularly noteworthy considering exposure to raw or fermented milk products that can increase susceptibility in individuals with compromised immune systems. Further investigations are essential to discern specific virulence factors associated with Lactococcus lactis, while highlighting the value of MALDI-TOF in rapide and precise identification, aiding in early therapeutic interventions and judicious antibiotic use.

Keywords: Lactococcus Lactis, Infective Endocarditis, MALDI-TOF, Opportunistic Bacteria.

INTRODUCTION

Lactococcus lactis, known until 1985 as Streptococcus lactis, is a facultatively anaerobic, catalase-negative, Gram-positive paired or short-chain arrangement of spherical cocci. It includes three subspecies: L. lactis subsp. lactis, L. lactis subsp. cremoris, and L. lactis subsp. Hordniae [1]. As the starter of cheese, Lactococcus lactis has a key role in dairy culture. It is also commonly used in fermented dairy products such as yogurt. This organism is occasionally isolated from the oropharynx, gut, or vagina and may be part of the normal flora [2, 3]. Lactococcus lactis is classified as mildly virulent and non-pathogenic. Human infections caused by Lactococcus lactis are rare and considered opportunistic. Here, we report a case of bacterial endocarditis due to L. lactis subsp lactis.

CASE PRESENTATION

A 21 year old patient with a medical history of NYHA stage II dyspnea was admitted to hospital for a worsening of his dyspnea now stage III associated with arthralgia and prolongated fever.

On admission, he had a body temperature of 37.2°C, 20 breaths per minute, heart rate 120/min, his blood pressure was 125/60 mmHg, and his blood oxygen saturation was 97%.

On clinical examination, a holosystolic murmur was audible at the third and fourth left intercostal space. No pathologic findings were found on lung and abdominal examination. No other mucocutaneous signs of endocarditis were observed.

Initial laboratory examination showed a white blood cell count of 15900/uL, with a neutrophils ratio of 60%, hemoglobulin of 12,7 g/dL and CRP of 42,67 mg/dl. Urine analysis and other biochemistry test results were all normal. The serum immunological investigation for HIV, HAV, HBV, HCV, CMV, Toxoplasma and EBV was found to be negative.

A transthoracic echocardiogram showed Atrioventricular discordance and ventriculoarterial discordance with double outlet right ventricle and presence of a vegetation responsible for severe pulmonary insufficiency.

ECG showed Left and right ventricular hypertrophy with secondary repolarization disorders.

After 18 hours, one of the anaerobic blood cultures turned positive to Gram-positive cocci (GPC), catalase-negative, which showed a-haemolysis on blood agar. MALDI-TOF MS identified the isolate as Lactococcus lactis.

We performed susceptibility testing using the disk diffusion test based on Streptococcus spp according to the recommendations of the EUCAST.

The isolate was sensitive to ampicillin, ceftriaxone, clindamycin, erythromycin, vancomycin, gentamycine and fluoroquinolone.

Amoxicillin susceptibility was also confirmed by a E-test, the MIC was 0,19 mg/l.

The patient was treated with intravenous amoxicillin– clavulanic 2Gx3 / day for lack of amoxicillin associated with gentamycin 5 mg/kg.

DISCUSSION

Lactococcus lactis is a spherical microaerophilic fermenting bacterium. Among Lactococcus subspecies, the dominant bacteria are Lactococcus lactis and Lactococcus cremoris, which are present in bovine skin commensals. They are very popular in the dairy industry as they are used in cheese and fermented dairy products [4]. Most bacteria used in food preparation are killed during digestion after ingestion, but Lactococcus lactis is usually unaffected during its passage through the gastrointestinal tract and thus can enter the bloodstream [5].

Lactococcus lactis has low virulence and is generally not pathogenic, but has recently been recognized as an opportunistic pathogen. This organism is occasionally isolated from the oropharynx, gut, or vagina and may even be part of the normal flora [3, 2]. One possible condition affecting the virulence and infectious potential of Lactococcus lactis in infective endocarditis is its heterologous expression capacity of surface glycoprotein Cnm which promotes adherence to cardiac tissue [6].

Hypotheses regarding the source of infection include exposure through ingestion or contact with unpasteurized dairy products or raw milk [5-8]. In some cases, direct transmission of Lactococcus lactis from the oral cavity or intraluminal spreading from contaminated hand has been reported in patients undergoing automated peritoneal dialysis [9-11].

There are few case reports of human infection with Lactococcus lactis in the literature, i.e. liver abscess in elderly patients, infective endocarditis, cerebellar abscess, sepsis in patients with chronic lymphocytic leukemia, septic arthritis, necrotizing pneumonia, peritonitis, Automated peritoneal dialysis and deep neck infections [12].

Our case shows that MALDI-TOF can be used for rapid identification of Lactococcus lactis. Due to some technical limitations, the incidence of L. lactis infection may be underestimated. First, the identification of Lactococcus spp is often challenging as it requires a nutrient-rich medium.

Second, Lactococcus. May be mistaken for E. faecalis by commercially available test kits due to similar morphological and biochemical profiles [13].

Antibiotic treatment of Lactococcus lactis endocarditis is not standardized due to the small number of reported cases and is mainly based on the results of drug susceptibility tests, with penicillin or third-generation cephalosporins and aminoglycosides being the most commonly used therapeutic drugs [5].

Due to the paucity of case reports, there is no consensus on the management of Lactococcus lactis induced endocarditis. It has been reported that Lactococcus lactis is sensitive to multiple antibiotics such as β-lactams (penicillin, amoxicillin, cefazolin, cefotaxime), macrolides (erythromycin, clarithromycin, clindamycin), amino Glycosides (amikacin, gentamicin) and vancomycin [8-15]. Likewise, there is no consensus on the duration of antimicrobial therapy.

In our case, the infection was asymptomatic, with mild inflammatory signs.

The rapid effect of antibiotic treatment is also because the drug susceptibility test of Lactococcus lactis shows no resistance to various antibiotics, especially penicillin.

From the literature we can easily presume that it may be associated with serious complications like cerebral embolisms [12]. Another reported complication is cardiac arrhythmia, which results from extreme inflammation of the conduction system of the heart in

infants [17]. Another patient had multiple mycotic aneurysms [7], and a young child had a pulmonary embolism [16].

Our patient recovered without complications after a 1-month follow-up.

CONCLUSION

L. lactis subsp. lactis, generally considered nonpathogenic, has been responsible for several systemic infections, including bacterial endocarditis.

Ingestion or exposure to raw or fermented milk products can make people with weakened immune systems or compromised local defense mechanisms susceptible to infection. However, immunocompetent subjects may also be involved.

Additional studies are required to elucidate whether L. lactis subsp. carry specific virulence factors. Our case shows that L. lactis is a probable pathogen and that MALDI-TOF may be helpful for a rapid and precise identification of L. lactis infection, and therefore an early therapeutic adaptation and a rationalization of the use of antibiotics.

Funding Statement: This research received no external funding.

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