

Infective endocarditis caused by *Lactococcus lactis* subsp. *lactis* and *Pediococcus pentosaceus*

A case report and literature review

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Abstract

Rationale: *Lactococcus lactis* and *Pediococcus pentosaceus* are rare pathogens which rarely caused infections in humans. Several cases with *L. lactis* endocarditis have been reported in the literature, among them few were caused by *L. lactis* subsp. *Lactis*. Opportunistic *P. pentosaceus* infections were rarely reported.

Patient concerns: A 66-year-old man presented to our hospital due to persistent fever for 15 days. A physical checking revealed a grade II holosystolic murmur at the heart apex. A chest computed tomography (CT) scan suggested bronchitis. *L. lactis* subsp. *lactis* was identified in blood cultures. Transthoracic and transesophageal echocardiography revealed the presence of a large hyperechogenic mass in the left atrium, and a large floating vegetation on the mitral valve with a severe mitral regurgitation.

Diagnosis: Infectious endocarditis caused by *L. lactis* subsp. *Lactis* was diagnosed.

Interventions: Levofloxacin (0.5 g/day) was used for 20 days; however, *L. lactis* subsp. *lactis* remained to be isolated from blood culture. Therefore, vancomycin (2 g/day) was used to replace levofloxacin. Six days after the treatment with vancomycin, the blood culture revealed no *L. lactis* subspecies *lactis*, but yielded a growth of gram-positive and non-spore forming cocci; and *P. pentosaceus* was identified. Antimicrobial susceptibility test revealed *P. pentosaceus* was sensitive to penicillin and levofloxacin. Vancomycin was discontinued, and levofloxacin (0.5 g/day) was restarted and treated for another 7 days. The patient recovered with negative blood culture results, and discharged from the hospital.

Outcomes: The patient recovered with negative blood culture results, and discharged from the hospital.

Lessons: Our patient had a long-period of antibiotic treatment with strategy alterations. Standard interpretation criteria of Clinical and Laboratory Standards Institute (CLSI) for *L. lactis* should be established, and molecular tests will increase the identification rate of *L. lactis* infections.

Abbreviations: CLSI = Clinical and Laboratory Standards Institute, CT = computed tomography, *L. lactis* = *Lactococcus lactis*, *P. pentosaceus* = *Pediococcus pentosaceus*.

Keywords: endocarditis, hemoculture, *Lactococcus lactis* subspecies *lactis*, levofloxacin, *Pediococcus pentosaceus*

1. Introduction

Lactococcus lactis (*L. lactis*), a gram-positive, catalase-negative, and non-motile spherical cocci, which can be found in pairs or short chains.^[1] *L. lactis* includes 3 subspecies: *L. lactis* subsp. *lactis*, *L. lactis* subsp. *cremoris*, and *L. lactis* subsp. *hordniae*; *L. lactis* subsp. *Lactis* can be found in raw milk, and has been widely used in fermented dairy products such as cheese. *L. lactis* subsp. *Lactis* can be occasionally isolated as a normal flora from the oropharynx, intestine, or vagina.^[2,3] *Pediococcus pentosaceus*

(*P. pentosaceus*) is gram-positive, non-motile, non-spore forming cocci.^[4] *P. pentosaceus* is commonly found in fermented plants such as pickled vegetables and silages.^[5,6] Both *L. lactis* subsp. *lactis* and *P. pentosaceus* can cause opportunistic infections in immunocompromised hosts. Several cases with *L. lactis* endocarditis have been reported in the literature, among them few were caused by *L. lactis* subsp. *Lactis*.^[6-11] Opportunistic *P. pentosaceus* infections were rarely reported.^[12] We herein describe a patient with endocarditis caused by *L. lactis* subsp. *lactis* and *P. pentosaceus* treated with antibiotics successfully. To our knowledge, this is the first case with endocarditis caused by *L. lactis* subsp. *lactis* in China.

2. Case report

A 66-year-old man presented to our hospital due to persistent fever for 15 days. His medical history included hypertension for 20 years, cerebral hemorrhage, coronary heart disease, cerebral infarction and Alzheimer disease. On admission, he had a body temperature of 38.2°C, 24 breaths per minute, heart rate 106/min, blood pressure 139/77 mmHg, and degree of blood oxygen saturation, 97%. A physical checking revealed a grade II holosystolic murmur at the heart apex. No Janeway lesions, splinter hemorrhages, conjunctival hemorrhage, or Osler nodules

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Table 1***L. lactis* subsp. *Lactis* related endocarditis cases through a PubMed search.**

References	Fever	Combined with other pathogen infection	Heart disease history	Outcome
Wood et al ^[13]	Yes	No	No history of heart disease	Recovered
Mannion et al ^[14]	Yes	No	Rheumatic valve disease	Recovered after surgery
Zecchini et al ^[6]	Yes	No	Atrial mixoma, mitral regurgitation	Recovered after surgery
Taniguchi et al ^[10]	Yes	No	No	Sudden infant death
This case	Yes	Yes, <i>P. pentosaceus</i>	Coronary heart disease	Recovered

were noted. Initial laboratory examination showed a white blood cell count of 16,690/uL, with a neutrophils ratio of 71.5%, hemoglobin of 129 g/L and erythrocyte sedimentation rate of 62 mm/h. Urine analysis and other biochemistry tests results were all normal. A chest computed tomography (CT) scan suggested bronchitis. Blood cultures were taken on the first day of admission. All the 3 sets of blood drawn from 3 different sites showed growth of gram-positive, catalase-negative, and non-motile coccus. *L. lactis* subsp. *lactis* was identified using a VITEK-2 Compact automatic microorganism identification and drug susceptibility analysis system (BioMerieux, France). Drug susceptibility analysis results showed *L. lactis* subspecies *lactis* was susceptible to penicillin, ampicillin, tetracycline, vancomycin, linezolid, and levofloxacin; while resistant to erythromycin, ceftriaxone, and clindamycin; and mesomeric to gentamicin. Based on these results, the patient was started on levofloxacin (0.5 g/day). Penicillin was not used for this patient due to a history of drug anaphylaxis. On the third day after hospitalization, an ultrasonic cardiogram indicated that indicated an ejection fraction of 65%, and left heart dilatation with a mitral valve. Transthoracic and transesophageal echocardiography revealed the presence of a large hyperechogenic mass in the left atrium, and a large floating vegetation on the mitral valve with a severe mitral regurgitation. The patient was diagnosed with infectious endocarditis. The infection may be opportunistic because the patient was an immunocompromised old man with many underlying diseases.

L. lactis subsp. *lactis* remained to be isolated from blood culture after 20 days of levofloxacin treatment; therefore, vancomycin (2 g/day) was used to replace levofloxacin. Six days after the treatment with vancomycin, the blood culture revealed no *L. lactis* subspecies *lactis*, but yielded a growth of gram-positive and non-spore forming cocci; and *P. pentosaceus* was identified. Antimicrobial susceptibility test revealed *P. pentosaceus* was sensitive to penicillin and levofloxacin. Vancomycin was discontinued, and levofloxacin (0.5 g/day) was restarted and treated for another 7 days. The patient recovered with negative blood culture results, and discharged from the hospital. He was lost to follow-up after 6 months; echocardiography revealed that the size of mitral vegetation reduced in the last follow-up.

The routine isolation and identification of these bacteria were performed in accordance with the Clinical and Laboratory Standards Institute (CLSI). The research was approved by the Ethics Committee of Liaocheng People's Hospital, Liaocheng, Shangdong Province, China. A written informed consent was obtained from the patient's guardian for reporting the case details.

3. Discussion

L. lactis is a gram-positive coccus, which is generally considered to be a pathogen with low virulence. Ten cases with *L. lactis*

endocarditis have been reported in the literature, and among them 5 were infected with *L. lactis* subsp. *lactis* (Table 1).^[6–10] All the *L. lactis* subsp. *lactis* infected cases presented with fever and 60% of them had a history of coronary heart diseases. Most of the cases had underlying diseases. Most were successfully treated with amoxicillin and clavulanate, except 2 cases died (1 due to sudden infant death and other due to intracerebral hemorrhage). Infectious endocarditis caused by *L. lactis* lacks a standard antimicrobial therapy strategy due to few susceptibility data of this bacteria. Formal CLSI criteria for antibiotics use has not been defined yet. In clinical practice, antibiotics are empirically given before culture results became available, or chosen based on drug-sensitivity results; penicillin and the third-generation cephalosporin combined with gentamicin are the most common choice for *L. lactis* infections.

In our patient, the results of hemoculture and drug-sensitive tests indicated that *L. lactis* subsp. *lactis* was sensitive to penicillin, vancomycin, linezolid, and levofloxacin. However, penicillin cannot be used due to anaphylaxis, so we used levofloxacin for treatment. Clinical symptoms improved, but blood cultures were still positive for *L. lactis* after 3 weeks of levofloxacin treatment. Considering inefficacy of levofloxacin, vancomycin was administered for this patient. Further blood culture showed negative results for *L. lactis* subsp. *Lactis*, but a growth of *P. pentosaceus* isolated.

P. pentosaceus is a lactic acid bacteria and used in biotechnology and food industry. In previous studies, the *P. pentosaceus* was considered nonpathogenic. Some species including *P. acidilactici* and *P. Pentosaceus* can cause infection have been reported recently. Up to now, only 1 case of endocarditis was reported.^[11] In China, *P. pentosaceus* was once separated in the sputum of a patient with long-term antituberculosis treatment with rifampicin and streptomycin, bringing in flora imbalance in partes oralis.^[12] Iwen et al indicated that daptomycin can be used to treat endocarditis caused by *Pediococcus* species.^[11] *P. pentosaceus* is naturally resistant to vancomycin, therefore, vancomycin was stopped and levofloxacin was re-started for the patient.^[11]

In conclusion, endocarditis co-infected by *L. lactis* subspecies *lactis* and *P. pentosaceus* was rare except for those who were immunocompromised.^[11] Although *L. lactis* subsp. *lactis* and *P. pentosaceus* had low pathogen virulence and fine response to antibacterials, endocarditis caused by *L. lactis* was still severe. Two cases of deaths *L. lactis* subsp. *lactis* endocarditis were reported in 2 previous studies.^[10,11] Our patient had a long-period of antibiotic treatment with strategy alterations. Standard interpretation criteria of CLSI for *L. lactis* should be established, and molecular tests will increase the identification rate of *L. lactis* infections.

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Author contributions

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