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Endocarditis caused by *Leuconostoc lactis* in an infant. Case report

Endocarditis por Leuconostoc lactis en un lactante. Reporte de caso

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Abstract

Introduction: Infections caused by *Leuconostoc lactis* are rare and are associated with multiple risk factors. According to the literature reviewed, there are no reported cases of endocarditis caused by this microorganism in the pediatric population.
Case presentation: An infant with short bowel syndrome was taken by his parents to the emergency department due to malnutrition. During his prolonged hospital stay, he presented multiple infections, so he required central venous catheter, prolonged enteral tube feeding and parenteral nutrition. In one of his nosocomial infection episodes, peripheral blood cultures were taken, and an echocardiogram was performed, achieving the diagnosis of endocarditis by *L. lactis,* which was treated with linezolid. After 21 days of treatment, the infectious process was controlled; however, in order to improve his condition and due to another bacteremia episode, he remained hospitalized. Finally, after 113 days, the patient was discharged, and comprehensive outpatient care was ordered.
Conclusion: Although rare in the pediatric population, endocarditis by *L. lactis* should be suspected in patients with multiple risk factors and polymicrobial infections. Timely and specific treatment, as in the reported case, can help avoid future complications.
Keywords: Infant; Endocarditis; *Leuconostoc* (MeSH).

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Resumen

Introducción. Las infecciones por *Leuconostoc lactis* son raras y se asocian a múltiples factores de riesgo; además, de acuerdo con lo revisado en la literatura relevante, no hay reportes de endocarditis causada por este microorganismo en población pediátrica.
Presentación del caso. Lactante con síndrome de intestino corto que fue llevado por sus padres al servicio de urgencias por desnutrición. Durante su estancia hospitalaria prolongada, el paciente presentó múltiples infecciones, por lo que requirió catéter venoso central (CVC), alimentación enteral prolongada y nutrición parenteral. En uno de los episodios infecciosos intrahospitalarios se tomaron hemocultivos periféricos y se realizó un ecocardiograma, lo que permitió diagnosticarlo con endocarditis por *L. lactis* y por lo cual se decidió iniciar manejo con linezolid. Luego de 21 días de tratamiento, la infección fue controlada, pero con el fin de mejorar su estado nutricional y debido a un nuevo episodio de bacteremia, se decidió prolongar su estancia hospitalaria. Finalmente, después de 113 días de hospitalización, fue dado de alta para continuar manejo integral ambulatorio.
Conclusión. A pesar de ser una entidad poco frecuente en pediatría, la endocarditis por *L. lactis* debe sospecharse en pacientes con múltiples factores de riesgo y con infecciones polimicrobianas. Un tratamiento oportuno y específico como el usado en el presente caso puede evitar complicaciones futuras.
Palabras clave: Lactante; Endocarditis; *Leuconostoc* (DeCS).

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Introduction

Leuconostoc is a genus of gram-positive bacteria with cocci morphology from the *Leuconostocaceae* family. It is catalase-negative, produces lactic acid, and is characterized by its intrinsic and chromosomal resistance to vancomycin.[1,2,3] This type of bacteria, which can be found in green vegetables and are used in wine, cheese, and sugar production, is not part of the microbiota of human beings.[1] However, in some cases, their presence is associated with the use of central venous catheters (CVC), the implementation of parenteral and enteral nutrition, gastrointestinal pathologies such as short bowel syndrome, and immunodeficiencies;[4-8] they have also been identified as part of polymicrobial infections.[1]

Infections caused by these microorganisms are rare in humans. Still, the most common species involved in human infections are *L. mesenteroides*, *Leuconostoc pseudomesenteroides*, *Leuconostoc citreum* and *Leuconostoc lactis.*[1] It is worth mentioning that *L. lactis* bacteremia has been associated with high mortality in immunodeficient patients.[9] Both systemic[9-11] and localized *Leuconostoc* infections have been reported in the literature,[12-24] including adult patients with endocarditis associated or not with intravenous drug administration.[23-28]

The present report describes the case of an infant treated at the Fundación Clínica Infantil Club Noel in the city of Cali (Colombia), who developed infectious endocarditis due to *L. lactis* while being treated in the pediatric intensive care unit (PICU).

Case presentation

The following is the case of a premature infant (born at 32 weeks of gestation) with a chronological age of 10 months, who presented neurodevelopmental delay, short bowel syndrome and bilateral hydronephrosis. The patient, who had a complete vaccination schedule for his age, had undergone an ileostomy for ileus stenosis correction at three days of birth, which he was still carrying.

The child was taken to the emergency department due to hyporexia. His physical examination on admission showed that he was hemodynamically stable and without clinical respiratory deterioration; however, he looked emaciated, pale, hypotonic and with bilateral enophthalmos. The anthropometric index for weight/height was -5.73 standard deviations (σ), for weight/age was -5.19 σ, and for height/age was -2.23 σ. Based on these results, the patient was diagnosed with acute malnutrition and malabsorption syndrome. He was admitted to the hospital and feeding with extensively hydrolyzed milk formula plus trace elements by nasogastric tube was initiated.

48 hours after admission, the patient presented septic shock and was transferred to the PICU, where empirical antibiotic treatment was started with vancomycin (60 mg/kg/day) plus cefepime (150 mg/kg/day). On the second day at the PICU, a CVC was placed to administer parenteral nutrition. In turn, peripheral blood cultures were taken, two of which were positive for *Klebsiella pneumoniae* with extended-spectrum beta-lactamase resistance pattern, so vancomycin and cefepime were replaced with meropenem (180 mg/kg/day), which was administered for 10 days.

Despite the antibiotic regime provided during his stay in the PICU, the patient persisted with fever >38°C. For this reason, the CVC was removed, and a peripheral blood culture was performed, which showed *Candida parasilopsis.* Based on that microbiological isolate, imaging studies were performed (echocardiogram and transfontanellar and total abdominal ultrasound scans), which ruled out fungal growths in the brain, abdomen, heart, and eyeball; the latter was assessed by the ophthalmology service. Considering the isolate obtained, management with intravenous fluconazole was administered (impregnation dose: 12 mg/kg/day, maintenance dose 6mg/kg/day) for 14 days; however, on the second day, the patient presented fever, tachycardia, hypotension and signs of breathing difficulty, so life support was provided. The patient underwent further testing in which two peripheral blood cultures were identified as positive for *Klebsiella pneumoniae* with a low-level penicillinase resistance pattern. Given these findings, cefazolin antibiotherapy (100 mg/kg/day) for 7 days was indicated. At the end of the treatment, two new blood cultures were taken, obtaining negative results for *C. parasilopsis*.

After 34 days in the PICU, the patient was transferred to the floor to continue comprehensive treatment. However, 11 days after being there, he presented a fever and tachycardia, so 2 peripheral blood cultures were requested, which isolated *L. lactis.* An echocardiogram was performed and showed vegetations in the right atrium, findings that allowed diagnosing infectious endocarditis and ruling out other organic foci of septic emboli. Considering the patient's condition, treatment with linezolid at 30 mg/kg/day for 21 days was indicated.

Acinetobacter baumannii was also isolated in the last 2 peripheral blood cultures; therefore, according to the antibiogram, therapy with ampicillin plus sulbactam (200 mg/kg/day) for 10 days was indicated. It should be noted that *A. baumannii* infection yielded negative results before *L. lactis*.

After the resolution of the bacteremia by *L. lactis* and *A. baumannii*, a new bacteremia by *Escherichia coli* with extended-spectrum beta-lactamase resistance pattern was documented, so treatment with meropenem (120 mg/kg/day) for 10 days was indicated.

After the removal of the CVC, the patient was treated using peripheral catheters. Also, during his hospital stay, the patient presented multiple infections, thus he underwent several tests to rule out immunodeficiency. The child also received intravenous immunoglobulin infusion since he underwent a flow cytometry that yielded normal results for T and B cells. Hypogammaglobulinemia M (35 mg/dL, normal range for age: 43-247 mg/dL) and hypogammaglobulinemia G (459 mg/dL, normal range for age: 486-1797 mg/dL) were also detected.

During his hospital stay, the patient received oral feeding, enteral feeding by nasogastric tube, mixed feeding (by nasogastric tube and parenteral nutrition) and parenteral nutrition for 3, 16 days, 84 and 10 days, respectively. After the patient was clinically stable and the blood cultures were negative, surgical closure of the ileostomy was indicated. Finally, after 113 days of hospitalization, when the control echocardiogram was normal and the child reached nutritional recovery, he was discharged from the hospital to continue comprehensive outpatient treatment.

The patient was readmitted to the hospital due to sepsis secondary to community-acquired pneumonia and acute diarrheal disease four months after discharge and was hospitalized for 48 days; once these pathologies solved, he was discharged from the hospital. It was not possible to continue with the outpatient follow-up.

Discussion

This article presents the case of an infant admitted to the emergency department due to acute malnutrition secondary to malabsorption of nutrients caused by short bowel syndrome. The patient developed immunodeficiency due to such malnutrition, which played an important role in the development of multiple infections. Factors such as CVC use, parenteral nutrition, continuous enteral feeding, short bowel syndrome and immunodeficiencies, which have been associated with *Leuconostoc* infections,[4-8] were observed in the present case.

It has been established that in patients with short bowel syndrome who require continuous enteral and parenteral nutrition, *L. lactis* may enter the gastrointestinal tract through contaminated enteral formulas.[1] However, in the present study, it could not be established whether the formulas used were contaminated by such bacteria. In this type of patients, it has also been identified that *L. lactis* can reach the bloodstream through CVC or enteral feeding tubes; in the case of the tubes, the bacteria can enter through possible mucosal lesions in the gastrointestinal tract.[1]

Only two cases of endocarditis due to *Leuconostoc* were found in the literature, and none of them occurred in pediatric patients. Firstly, Valencia *et al.*[25] presented the case of an immunocompetent adult with endocarditis, history of intravenous drug use, aortic valve involvement and septic emboli in retina, spleen and brain; the patient was treated for *Leuconostoc* with ceftriaxone (2 grams per day) and daptomycin (600 milligrams per day) for 6 weeks until negative blood cultures were obtained. Secondly, Starr[26] reported the case of an immunocompetent adult patient with endocarditis and aortic valve involvement who received treatment for *Leuconostoc* with penicillin (6 million units every 6 hours) for 6 weeks, and gentamicin (80 milligrams every 8 hours) for 2 weeks; even though the infection was controlled, the patient required aortic valve replacement.

Penicillin, alone or combined with aminoglycosides, is the first choice to treat *Leuconostoc* infections;[1,28] however, in immunodeficient patients with invasive infections, as in the present case, the indication should be daptomycin or linezolid.[28]

Conclusions

L. lactis infections, including endocarditis, are rare and should be suspected in patients with polymicrobial infections, short bowel syndrome, and continuous enteral and parenteral nutrition. Also, proper diagnosis and timely and specific treatment, as used in the present case, can help avoid future complications.

Ethical considerations

This case report was approved by the Ethics Committee of the Fundación Clínica Infantil Club Noel in Cali, Colombia, according to an unnumbered meeting minutes from January 30, 2019. Similarly, informed consent was obtained from the patient's mother.

Conflicts of interest

None stated by the authors.

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