World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(CASE REPORT)

Case report: *Lactococcus lactis Bacteremia* in an Infant with Kasabach-Merritt Syndrome

CHOUIKH Meryem *, BENHAMOU Ibtissame, BENHOUMICH Taoufik, LAMRANI HANCHI Asmae and SORAA Nabila

Laboratoire de microbiologie, CHU Mohamed VI, 1, Av. Ibn Sina, Marrakech, Maroc.

World Journal of Advanced Research and Reviews, 2024, 24(03), 533–539

Publication history: Received on 18 October 2024; revised on 02 December 2024; accepted on 04 December 2024

Article DOI: https://doi.org/10.30574/wjarr.2024.24.3.3667

Abstract

Lactococcus lactis is a Gram-positive coccus typically non-pathogenic in humans. Here, we present the case of a 2-month-old infant hospitalized in the neonatal intensive care unit for management of Kasabach-Merritt syndrome, treated with chemotherapy. During hospitalization, the infant developed clinical signs suggestive of severe sepsis alongside abnormal laboratory findings, including a disrupted blood workup (CBC, CRP, etc.).

In light of this clinical presentation, blood cultures were performed, revealing *Lactococcus lactis* bacteremia. The species was identified in two separate blood cultures taken two days apart, confirmed through mass spectrometry analysis (MALDI-TOF). Based on the antibiogram results, treatment with ceftriaxone was initiated and continued for 14 days, resulting in significant clinical improvement.

This case highlights the diagnostic and therapeutic challenges encountered in the neonatal setting and underscores the need for heightened awareness of atypical pathogens, particularly in complex clinical situations such as immunocompromised infants.

Keywords: *Lactococcus lactis*; Bacteremia; Infant; Immunosuppression

1. Introduction

Lactococcus spp. is a bacterium primarily utilized in the dairy industry for the production of cheese and other fermented foods, and it is generally considered non-pathogenic in humans. However, over the past two decades, several studies have reported that these bacteria can cause infections, particularly in immunocompromised patients [1].

We present a rare case of bacteremia caused by *Lactococcus lactis* in a 2-month-old infant hospitalized for Kasabach-Merritt syndrome and undergoing chemotherapy. This case highlights the diagnostic and therapeutic challenges posed by this bacterium in a neonatal context, emphasizing the need for heightened awareness of atypical pathogens in complex clinical situations.

2. Case report

The patient was a 2-month-old infant admitted to the neonatal intensive care unit for the management of Kasabach-Merritt syndrome, characterized by vascular tumors and associated coagulopathy. During hospitalization, the infant developed clinical signs suggestive of severe sepsis, including fever, a prolonged capillary refill time of 6 seconds, and

*Corresponding author: CHOUIKH Meryem

cutaneous mottling, with no identifiable primary infectious focus upon clinical examination. Laboratory findings revealed leukopenia and a significant increase in C-reactive protein (CRP) levels, reaching 137 mg/L.

Blood cultures were performed to identify the pathogen responsible for the infection. *Lactococcus lactis* was identified in two separate samples taken 48 hours apart, with both cultures turning positive within 8 to 12 hours of incubation.

Direct examination revealed Gram-positive cocci arranged in diplococci (Figure 1). The culture showed fine, grayish, translucent colonies growing on both blood agar and the selective Colistin Nalidixic Acid (CNA) medium (Figure 2).

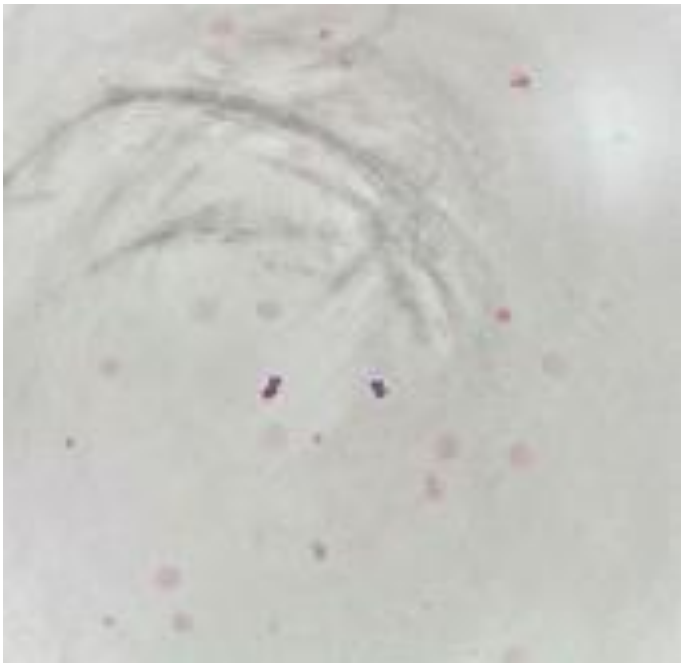

Figure 1 Gram-positive cocci arranged in diplococci**.**

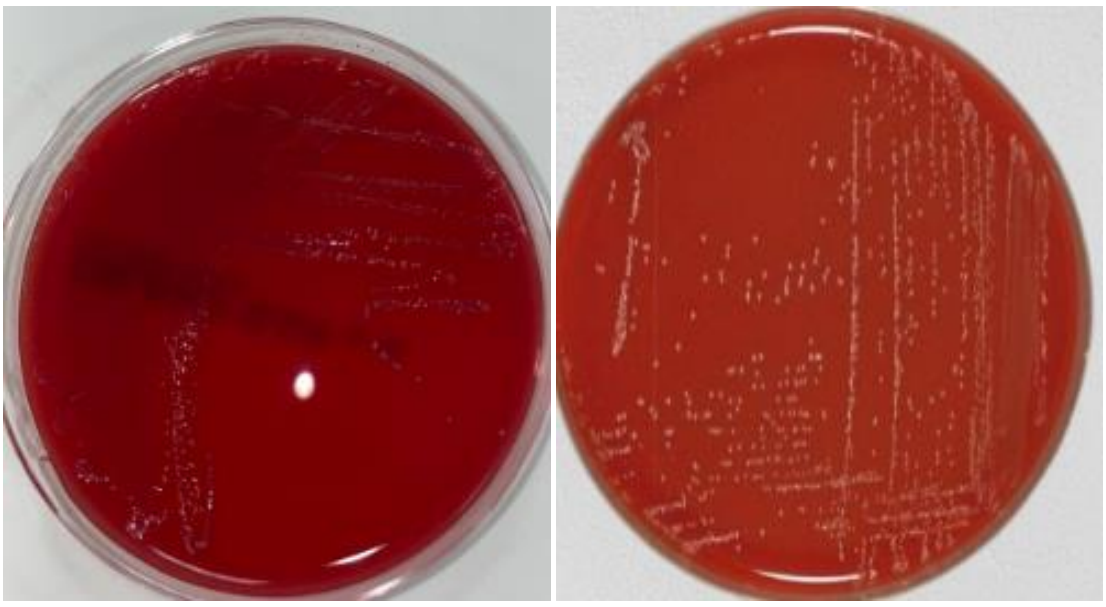

Figure 2 Fine grayish colonies on blood agar and Colistin Nalidixic Acid (CNA) medium**.**

The identification of the colonies was performed using MALDI-TOF mass spectrometry, which confirmed the species as *Lactococcus lactis*.

Antibiotic susceptibility testing (AST) was conducted using the disk diffusion method on Mueller-Hinton 2 agar enriched with 5% sheep blood (MHS). The antibiotics tested included penicillin G, amoxicillin-clavulanic acid, vancomycin, norfloxacin, levofloxacin, moxifloxacin, erythromycin, lincomycin, and gentamicin (Figure 3). The strain was sensitive to all tested antibiotics except penicillin G and gentamicin.

Given the reduced sensitivity to penicillins, a minimum inhibitory concentration (MIC) test was performed for ceftriaxone, which demonstrated sensitivity at 0.38 mg/L (Figure 4).

The inhibition zone diameters were measured and categorized as "Resistant (R)," "Intermediate (I)," or "Sensitive (S)" according to the guidelines of the Antibiogram Committee of the French Society of Microbiology (FMSAC/EUCAST, 2023).

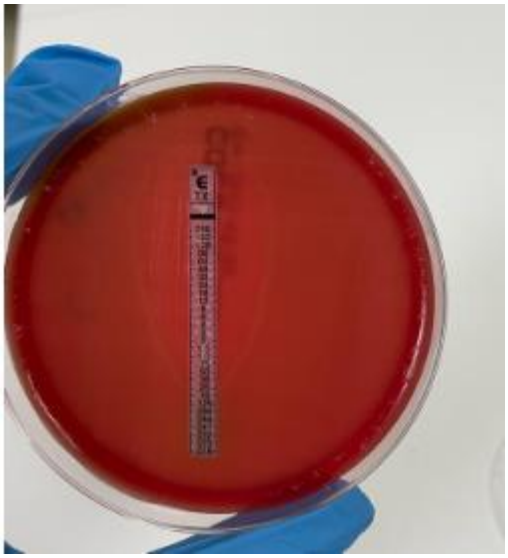

Figure 4 Minimum inhibitory concentration (MIC) of ceftriaxone for *Lactococcus lactis* at 0.38 mg/L.

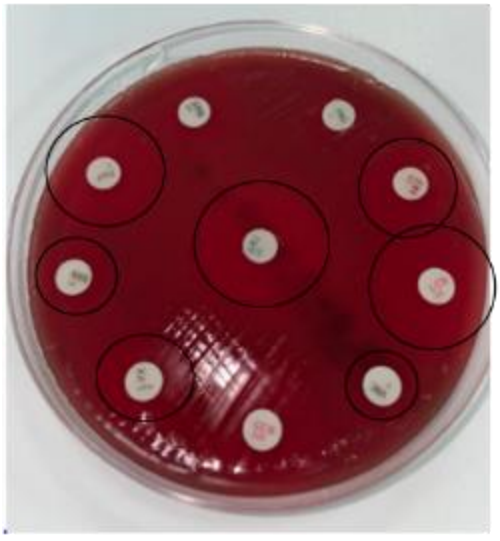

Figure 3 Antibiogram using the disk diffusion method for *Lactococcus lactis*.

Initially, a probabilistic antibiotic therapy based on third-generation cephalosporins (C3G) and gentamicin was administered and continued after the antibiogram results. The subsequent clinical course showed significant improvement both clinically and biologically: the infant became afebrile, the mottling resolved, and CRP levels decreased.

3. Discussion

The *Lactococcus lactis* genus includes former non-beta-hemolytic streptococci, most commonly isolated from dairy products. These are environmental opportunistic bacteria that can occasionally cause rare but serious infections in humans, such as sepsis and endocarditis.

The genus *Lactococcus* was established in 1985 by grouping *Streptococcus lactis* and its variants, which are widely used in the production of dairy products due to their flavor-enhancing and preservative properties [2,3].

3.1. Identification of the Genus and Species

Lactococci typically appear as diplococci or chains of cocci. They are non-motile, Gram-positive, anaerobic but aerotolerant, and catalase-negative bacteria [4,5]. These organisms generally grow in 4% NaCl and have an optimal growth temperature beteen 20°C and 30° C [3,4,6,7].
Distinguishing lactococci from enterococci can be challenging, as up to 45% of lactococci are capable of growing at 45°C [4].
This genus comprises nine species, two of which have been isolated in humans: *Lactococcus garvieae* and *Lactococcus lactis* [3,4]. Marked similarities between subspecies and species, such as those observed between *L. lactislactis* and *L. garvieae*, complicate their identification and distinction due to their close genetic relationship and similar phenotypic characteristics [4,8,9]. Today, the identification of *Lactococcus* species has been greatly simplified with the introduction of mass spectrometry (MALDI-TOF) in clinical laboratories.

3.2. Pathogenic Potential

Although cases involving *Lactococcus lactis* are rare in the literature, this bacterium has been associated with severe, and occasionally fatal, infections [10-13]. These infections predominantly affect immunocompromised individuals [14].

Neonatal infections caused by *Lactococcus lactis* are extremely rare. Previous studies have reported isolated cases of severe infections, including endocarditis and bacteremia, in immunocompromised patients or those with severe underlying medical conditions (Table).

Table 1 Epidemiological, Clinical, and Therapeutic Data on *Lactococcus lactis* Infections

References	Country, Year	Age	Risk Factor	Infection Site	Antibiotic Treatment and Duration of Therapy
Nakarai et al. [22]	Japon, 2000	14 years	None	Hepatic Abscess	Cefotiam, amikacin et clindamycin ; 35 days
Gilkman et al. [23]	Israel, 2010	9 months	- Parenteral Nutrition - Hirschsprung's Disease - Central Venous Catheter	Bacteremia	Vancomycine ; 10 days
Karaaslan et al. [24]	Turkey, 2014	1 year	-Down Syndrome - Hirschsprung's Disease - Central Venous Catheter	Bacteremia	Vancomycine ; 10 days
Taniguchi et al. [25]	Japan, 2015	4months	None	Endocarditis	None (Patient deceased)
El Firmani et al. [26] Cas #1	United States, 2022	2 years	- Parenteral Nutrition - Hirschsprung's Disease - Central Venous Catheter	Bacteremia	Ceftriaxone ; 14 days
El Firmani et al. [26] Cas #2	United States, 2022	21 months	-Congenital Nephrotic Syndrome -Hypogammaglobulinemia -Central Venous Catheter	Bacteremia	Ceftriaxone ; 10 days

El Firmani et al. [26] Cas #2	United States , 2022	6 months	-Bronchopulmonary Dysplasia -Intestinal Perforation + Ileostomy	Bacteremia	Vancomycine ; 10 days
Notre étude	Maroc, 2024	2 months	-Kasabach-Merritt Syndrome	Bacteremia	Ceftriaxone ; 14 days

3.3. Antibiotic Susceptibility

Few studies have investigated the antibiotic susceptibility of lactococci [4,15]. However, based on available observations, no resistance with significant therapeutic implications has been reported. Lactococci remain susceptible to several classes of antibiotics, including beta-lactams, glycopeptides, clindamycin, and cotrimoxazole. Nevertheless, they exhibit natural resistance to aminoglycosides [16-21].

3.4. Comparison with the Literature

We conducted a review of the literature on pediatric infections caused by *Lactococcus lactis* species and compared our case with seven other documented pediatric cases. This comparison provides a better understanding of the clinical aspects and therapeutic outcomes associated with these rare but significant infections. It also highlights the risk factors and effective treatments for these opportunistic infections in children (Table).The average age of the patients is 3 years. Five out of seven patients had an underlying risk factor. The most common infection site associated with *Lactococcus lactis* is bacteremia, accounting for five of the seven cases. The remaining two cases involved a hepatic abscess and endocarditis. Third-generation cephalosporins and vancomycin are the most commonly used treatments for *Lactococcus lactis* infections. The duration of treatment varies from 10 to 35 days, depending on the infection site.Based on the available scientific literature, our case represents one of the first pediatric cases of *Lactococcus lactis* bacteremia reported in Morocco. The primary infectious site of the *Lactococcus lactis* bacteremia in this patient is unknown; however, it is worth noting that the infant was on artificial feeding and had an immunocompromised condition.

The total duration of ceftriaxone treatment was 14 days, resulting in a favorable clinical and biological evolution for the patient.

Our case highlights the necessity of maintaining a high level of vigilance for unusual pathogens, particularly in patients undergoing aggressive treatments such as chemotherapy.

4. Conclusion

This case highlights the importance of considering atypical pathogens such as *Lactococcus lactis* in neonatal infections, especially in patients with high-risk factors like chemotherapy treatment. Effective management of neonatal sepsis requires clinical vigilance and an empirically broad initial approach, followed by adjustments based on specific microbiological findings.

The rarity of *L. lactis* as a pathogen in neonatal sepsis should encourage broader documentation and ongoing research into its pathogenic mechanisms and treatment responses.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] Forbes BA, Sahm DF, Weissfeld AS (2002) Streptococcus, Enterococcus,and similar organisms. In Bailey& Scott's Diagnostic Microbiology. 11 ed. New York: Mosby Inc.p:373-381.

[2] Jarvis AW, Jarvis BD. Deoxyribonucleic Acid homology among lactic streptococci. Appl Environ Microbiol. 1981 Jan;41(1):77–83

[3] Schleifer, K. H., Kraus, J., Dvorak, C., Kilpper-Bälz, R., Collins, M. D., & Fischer, W. (1985). *Transfer of Streptococcus lactis and Related Streptococci to the Genus Lactococcus gen. nov. Systematic and Applied Microbiology, 6(2), 183–195.*

[4] *Facklam RR, Elliott JA. Identification, classification, and clinical relevance of catalase-negative, Gram-positive cocci, excluding the Streptococci and Enterococci. ClinMicrobiol Rev 1995;4:479–95*

[5] *Carr FJ, Chill D, Maida N. The lactic acid bacteria: a literature survey. Crit Rev Microbiol 2002;28:281–370.*

[6] *FSharpe ME. Identification of the lactic acid bacteria. In: Skinner FA, Lovelock DW, editors. Identification methods. London: Academic Press; 1979. p. 233–59.*

[7] De Froissart H. Les bactérieslactiques. Revues des ENIL 1981;66:29– 33.

[8] Elliott JA, Collins MD, Pigott NE, Facklam RR. Differentiation of *Lactococcus lactis* and Lactococcusgarvieae from humans by comparison of whole-cell protein patterns. J ClinMicrobiol 1991;12:2731–4.

[9] Zlotkin A, Eldar A, Ghittino C, Bercovier H. Identification of *Lactococcusgarvieae* by PCR. J ClinMicrobiol 1998;36:983–5.

[10] Lin KH, Sy CL, Chen CS, Lee CH, Lin YT, Li JY Endocarditeinfectieusecompliquée par unehémorragieintracérébrale due à *Lactococcus lactis* subsp. cremoris. Infection. 2010;38:147–149.

[11] Rostagno C., Pecile P., Stefano PL Endocarditeprécoce à Lactococcuslactis après réparation de la valve mitrale : rapport de cas et revue de la littérature. Infection. 2013;41:897–899.

[12] Taniguchi K., Nakayama M., Nakahira K., Nakura Y., Kanagawa N., Yanagihara I., Miyaishi S. Mort subite du nourrisson due à une endocardite infectieuse à lactocoque. Méd. juridique. 2016 ; 19 : 107-111.

[13] Mansour B., Habib A., Asli N., Geffen Y., Miron D., Elias N. Un cas d'endocarditeinfectieuse et d'embolieseptiquepulmonairecausée par *Lactococcus lactis*. Case Rep. Pediatr. 2016;2016:1024054.

[14] Georgountzos G., Michopoulos C., Grivokostopoulos C., Kolosaka M., Vlassopoulou N., Lekkou A. Endocarditeinfectieuse chez un jeune adulte due à *Lactococcus lactis* : rapport de cas et revue de la littérature G. Case Rep. Med. 2018;2018:5091456.

[15] Orberg PK, Sandine WE. Survey of antimicrobial resistance in lactic streptococci. Appl Environ Microbiol 1985;49:538–42.

[16] Torre D, Sampietro C, Fiori GP, Luzzaro F. Necrotizing pneumonitis and empyema caused by *Streptococcus cremoris* from milk. Scand J Infect Dis 1990;22:221–2.

[17] Nakarai T, Morita K, Nojiri Y, Nei J, Kawamori Y. Liver abscess due to *Lactococcus lactis cremoris*. Pediatrics Intern 2000;42:699–701.

[18] Durand JM, Rousseau MC, Gandois JM, Kaplanski G, Mallet MN, Soubeyrand J. *Streptococcus lactis* septicemia in a patient with chronic lymphocytic leukemia. Am J Hematol 1995;50:64–5.

[19] Campbell P, Dealler S, Lawton JO. Septic arthritis and unpasteurised milk: case report. J ClinPathol 1993;46:1057–8.

[20] Pellizer G, BenedettiP, Biavasco F, Manfrin V, Franzetti M, Scagnelli M, et al. Bacterial endocarditis due to *Lactococcus lactis* subsp. cremoris: case report. ClinMicrobiol Infect 1996;2:230–2

[21] Fefer JJ, Ratzan KR, Sharp SE, Saiz E. *Lactococcus garvieae* endocarditis: report of case and review of the literature. DiagnMicrobiol Infect Dis 1998;32:127–30.

[22] Nakarai T, Morita K, Nojiri Y, Nei J, Kawamori Y. Liver abscess due to *Lactococcus lactis cremoris*. Pediatr Int. (2000) 42:699–701.

[23] Glikman D, Sprecher H, Chernokozinsky A, Weintraub Z. *Lactococcus lactis* catheter-related bacteremia in an infant. Infection. (2010) 38:145–6.

[24] Karaaslan A, Soysal A, Sarmiş A, et al. *Lactococcus lactis* catheter-related bloodstream infection in an infant: case report. Jpn J Infect Dis. (2015) 68:341–2.

[25] Taniguchi K, Nakayama M, Nakahira K, et al. Sudden infant death due to lactococcal infective endocarditis. Leg Med. (2016) 19:107–11.

[26] El Firmani S, Maples H, Balamohan A. Lactococcus Species Central Line-Associated Bloodstream Infection in Pediatrics: A Case Series Sec. Infectious Diseases: Pathogenesis and Therapy (2022)