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CASE REPORT OPEN ACCESS

# Bacteremia Due To Leclercia Adecarboxylata in an Immunocompromised Patient From A Tertiary Care Centre in North India: A Case Report

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## ABSTRACT

*Leclerciaadecarboxylata* (LAD), despite its low virulence and ubiquity it has been recognized as an emerging human pathogen in both immunocompromised and immunocompetent patients. Correct identification of LAD in clinical specimens is necessary for epidemiological data, diagnosis, treatment, and resistance profile.We report a case that illustrates the importance of considering LAD as a possible cause of infections in immunocompromised patients.

**Keywords** – Bacteremia, *Leclerciaadecarboxylata*, immunocompromised, MALDI-TOF

## INTRODUCTION

*Leclerciaadecarboxylata*(LAD) is a rarely isolated motile Gram-negative bacillus, facultative-anaerobe, that has been recognized as an emerging opportunistic pathogen.[1]It belongs to the Enterobacteriaceae family and is recovered from environmental specimens, aquatic waters, soil, and gut flora of animals as well as humans.[2] It shows few similar phenotypic characteristics to *E.coli* and was previously classified as *Escherichia adecarboxylata*.[3,4] Rare incidences of this human infection, which often affects immunocompromised people, have been reported in adults, with fewer cases in children and even less prevalent in healthy individuals.[1,5] There have been reports of opportunistic infections by this pathogen, which have been attributed to risk factors such as wounds, immunosuppression, and the presence of catheters.[3] This bacteria has been isolated from numerous specimens in various clinical conditions like sepsis, pneumonia,

cholecystitis, endocarditis, catheter-related bloodstream infection, diarrhea, peritonitis, soft tissue infection, cellulitis, and urinary tract infection.[1,4,6]Immunocompromised patients are vulnerable to infection due to both immunological dysregulation and immunosuppressive medication. Infections with LAD are frequently not fatal owing to its antibiotic susceptibility profile and low virulence.[5]Accurately identifying LAD in clinical samples is essential for epidemiological data, diagnosis, and treatment.[7] Frequently the correct diagnosis is often missed, delayed, or ignored, which may ultimately lead to an inappropriate therapeutic approach. Although it is susceptible to antibiotics, but extended-spectrum beta-lactamases and carbapenemase resistance have been seen to develop.[5,8]It is critical to periodically monitor susceptibility profile of LAD in order to monitor changes in antibiotic resistance.[6] There have been reports of outbreaks of carbapenem-resistant LAD in hospitals related to the use of contaminated total parental nutrition.[8]

We report a case that illustrates the importance of considering LAD as a possible cause of infections in immunocompromised patients.

**CASE REPORT**

A 30-year-old female gravid 4 with a history of suffering from SLE, anti-phospholipid syndrome, and recently one week back had an incomplete abortion. The patient presented to the Emergency Department of SGPGIMS Lucknow with chief complaints of severe generalized weakness, unable to perform daily activities and shortness of breath. She had undergone a dilatation and curettage at 7 weeks' gestation with heavy bleeding and clots,at a private family planning polyclinic which has no affiliation with our institute. She denied experiencing vaginal bleeding or abnormal vaginal discharge at presentation. Her weakness was so severe that she was not able to perform her daily activities.

The patient was conscious, oriented and alert however she did not have a fever. She looked extremely pale and tachypneic, and there was distention of the external jugular veins. On auscultation bilateral basal and infra- axillary crepts were heard. Her abdomen was soft and non-tender. The rest of the physical examination remained unremarkable. The patient was admitted to our hospital for acute heart failure secondary to anemia. The vital signs were as follows: 120/70mmhg, heart rate of 100/min, respiratory rate of 20/min, oxygen saturation on room air of 97%, elevated jugular venous pressure, and body temperature of 37.2º C (98.96º F). Laboratory examination revealed hemoglobin 4.8g/dl, white blood cell count $4.48 \times 10^9$/L, and platelets $104 \times 10^9$/L. Kidney-function tests and liver-function tests were within normal limits. C-reactive protein (CRP) was 0.76mg/l, serum ferritin 65.4µg/l, procalcitonin 0.034ng/ml, and a positive anti-dsDNA antibody. Chest X-ray showed bilateral signs of early lung oedema. Her past medical history included treatment with immune-suppressants, anticoagulants, steroids for systemic lupus erythematosus with anti-phospholipid syndrome, and hypertension, which was diagnosed five years back. A CT pulmonary angiography was performed which revealed few ground glass opacities in basal segments. This was done to rule out pulmonary embolism in light of the recent abortion, acute dyspnea, and history of anti-phospholipid syndrome. Blood cultures were obtained, and azithromycin was empirically administered as the patient had developed an allergic reaction to ceftriaxone. She was transfused 2 units of packed red cells and diuretics were administered in conjunction with hemodynamic status monitoring for congestive heart failure. Blood cultures became positive after 24 hours of incubation. From the positively flagged automated BD BACTEC™ FX Aerobic blood culture bottle, a Grams stain was performed showing Gram negative bacilli. An inoculum was sub-cultured on Blood agar and MacConkey agar which showed a growth of grey large colonies and lactose-fermenting pink colonies respectively, that resembled *E. coli*(Figure 1 & Figure 2). Grams stain of the colony showed Gram negative bacilli (Figure 3).

Using matrix-assisted laser desorption ionization-time of flight mass spectrometry (MALDI-TOF MS) based Vitek MS system (BioMérieux, France), *Leclerciaadecarboxylata* was identified.[9] Repeat blood cultures from the patient did not grow the organism. LAD was shown to exist in pure culture, independent of any other pathogens. Antimicrobial susceptibility was performed using VITEK® 2 (BioMérieux, France) MIC method, and the isolate was found to be susceptible to the following antibiotics (Table 1).[10]The patient was switched over to ciprofloxacin 500mg BD and had an uneventful recovery.

**TABLE 1: Antimicrobial susceptibility pattern of *L. adecarboxylata* recovered from blood culture**

| Antibiotic | MIC (µg/ml) | Sensitivity |
|---|---|---|
| Amoxicillin-clavulinic acid | ≤ 2 | S |
| Piperacillin-tazobactam | ≤ 4 | S |
| Cefuroxime | ≤ 2 | S |
| Ceftriaxone | ≤ 0.25 | S |
| Cefoperazone-sulbactam | ≤ 8 | S |
| Cefepime | ≤ 0.12 | S |

| | | |
|---|---|---|
| Ertapenem | ≤ 0.12 | S |
| Imipenem | ≤ 0.25 | S |
| Meropenam | ≤ 0.25 | S |
| Amikacin | ≤ 2 | S |
| Gentamicin | ≤ 1 | S |
| Ciprofloxacin | ≤ 0.25 | S |
| Trimethoprim/sulfamethoxazole | ≥ 320 | R |
| Fosfomycin | ≥ 256 | R |

**MIC = minimum inhibitory concentration; S= sensitive; R = resistant**

## DISCUSSION

Recently, *Leclerciaadecarboxylata* has been recognized as an emerging pathogen. Its natural habitats include aquatic environments and water bodies. There are also accounts of food isolation of this bacterium.[3,5,9]Immunocompromised patients are more likely to suffer severe infectious disease complications due to substantial immune dysfunction and are associated with higher rates of morbidity and mortality.[10, 11,12] Our patient suffered from systemic lupus erythematosus and anti-phospholipid syndrome, which also impair the immune system and pose a greater risk of bacteremia.[11] Additionally, it has been demonstrated that bacteremia tends to raise fatality rates in such patients by up to 33% and recurrence rate by 27.2%.[13,14] LAD is frequently misidentified and overlooked due to its phenotypic resemblance to *E. coli*.[3] It is noteworthy to remark automated technologies such as MALDI-TOF become indispensable in the identification of uncommon microorganisms and determining their true prevalence for epidemiological data, by precisely identifying 97.7% of theEnterobacteriaceae family.[7,15]

Although the bacteria show a low–virulence, in our case it was considered pathogenic as the patient is immunocompromised, on immuno-suppressants, and had a history of catastrophic anti-phospholipid syndrome which increases its importance and need for prompt antibiotic coverage. Failure to acknowledge its gravity may lead to mortality.[12]Our patient denied contact with any livestock, so we suspect that vaginal colonization and disruption of the vaginal flora during dilation and curettage seem to be the most convincing site of entry for the organism leading to bacteremia. Nonetheless, there are case reports of patients with bacteremia caused by *Leclercia* with a lack of positive cultures from the suspected infection site.[4,5] A swimmer with keratitis and a surfer with cellulitis of foot were found to have been exposed to an aquatic environment.[2,16] Our patient was similarly exposed while spending vacations on a beach. *Leclercia* is often isolated as a part of poly-microbial cultures; however, there have been case reports of LAD being isolated in pure culture from the vaginal swab of an immunocompetent patient with vaginal discharge.[17] According to a few studies, this organism is most commonly isolated from wounds on the lower extremities as part of a mixed flora.[3,16]Upon analysis of the data from two case series, it was discovered that *Leclercia* infection was more common in immunocompromised individuals than in immunocompetent patients.[2,3] Reports of endocarditis and catheter-related bacteremia attributed to *Leclercia* are not uncommon.[1,2,4,6] The significance of isolating LAD from cases that result in hospital-acquired pneumonia is discussed by Prakash et al.[18] In the literature review, the isolate is found to have a high level of antibiotic sensitivity.[1,4,5,6,17]Zayet et al reported six patients diagnosed with *Leclercia* all presenting with fever showed susceptibility to all antibiotics except for fosfomycin.[2]Our study revealed that the resistance patterns of the isolate to trimethoprim/sulfamethoxazole and fosfomycin were consistent with those described by Shaikhain et al.[5] There have been reports of outbreaks of carbapenem-resistant LAD in hospitals related to the use of contaminated total parental nutrition.[8] Reports have been published concerning resistant LAD isolates exhibiting SHV-12 β-lactamase and VIM-1 Metallo-β-lactamases.[5] The intrinsic susceptibilities of 101 *Leclercia* strains to 70 antimicrobial drugs were thoroughly analyzed, and it was shown that the isolates have inherent resistance to several drugs, including Penicillin G, oxacillin, erythromycin, roxithromycin, clarithromycin, ketolids, lincosamides, streptogramins, linezolid, glycopeptides, rifampicin, fusidic acid, and fosfomycin.[19] Nonetheless, there have also been case reports of pediatric mortality with subsequent LAD sepsis.[20,21]However, the inability to identify the source of the bacteremia from vaginal cultures may be considered a limitation of the case presented. Molecular assays were not available at our facility, which prevented the carrying out of nucleic acid studies like 16S rRNA sequencing.

## CONCLUSION

This case revealed the importance of a rare infection in an immunocompromised patient by *L.adecarboxylata* (LAD), an emerging pathogen. While our comprehension of its clinical significance continues to evolve, vigilance in surveillance, accurate diagnosis, and appropriate antimicrobial management are paramount. Further research is needed to elucidate its epidemiology, virulence factors, and optimal treatment strategies eventually impacting patient health and decreasing mortality.

**FIGURE 1. Blood agar with grey moist large colonies**

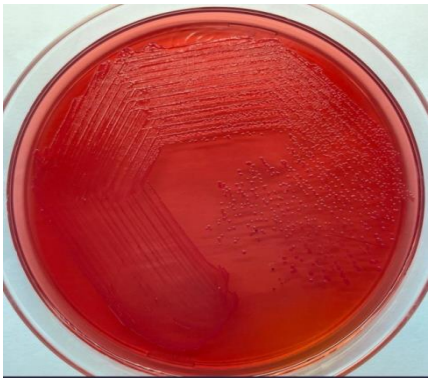

**FIGURE 2.MacConkey agar with lactose fermenting pink colonies**

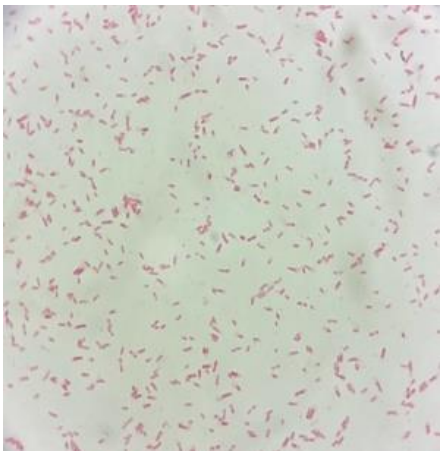

**FIGURE 3. Grams stain showing Gram negative bacilli**

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