**Lautropia mirabilis**: An Exceedingly Rare Cause of Peritoneal Dialysis-Associated Peritonitis

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**Keywords**

*Lautropia mirabilis* · Peritoneal dialysis-associated peritonitis · Gram-negative peritonitis · Case report

**Abstract**

*Lautropia mirabilis* is a gram-negative cocoid bacterium isolated from oral and upper respiratory sites with unclear pathogenic potential. We present an exceedingly rare case of peritoneal dialysis-associated peritonitis due to *L. mirabilis* in a patient with a recent history of periodontal infection, successfully treated with intraperitoneal antibiotics. We propose that clinicians consider this organism as a potential cause of illness.

**Introduction**

*L. mirabilis* is a motile, facultatively anaerobic, gram-negative cocoid bacterium from the *Burkholderiaceae* family [1]. It was allegedly first isolated in 1930 by J. Ørskov on Bordet-Gengou cough plates of patients suspected of having pertussis infection and named *Sarcina mirabilis* [2]. No strains were kept and it remained largely unknown until 1994 when Gerner-Smidt et al. [2] described a similar bacteria isolated on the gingival margin of healthy human patients. Its status as a new species was then validated as *L. mirabilis*, in honor of Dr. Hans Lautrop, a Danish bacteriologist who pointed out the similarity between this bacterium and Ørskov’s description [2].
L. mirabilis was first linked to dental plaque formation [2]. Since then, it has been identified in the oral cavity of children infected with the human immunodeficiency virus [3] (with no clinically apparent disease) and identified as the predominant microorganism in the sputum of a cystic fibrosis patient with pneumonia [4]. Even though its significance may be difficult to ascertain on these mixed flora sites, a potential for invasive disease has been proposed, as it was isolated from normally sterile sites such as blood and peritoneal fluid [5]. Recently, it was first reported as a cause of peritoneal dialysis (PD)-associated peritonitis in Australia, on a patient with no dental or gingival disease, with complete recovery following intraperitoneal (IP) ceftazidime [6].

Case Report/Case Presentation

A 59-year-old woman with autosomal dominant polycystic kidney disease with end-stage chronic kidney disease on machine-assisted automated PD for 2 years, presented with a 3-day history of cloudy dialysis effluent, mild abdominal pain, reduced ultrafiltration, and no fever. She had no recent history of peritonitis, cyst infection or rupture, bowel or gynecological procedures, or accidental disconnections from her automated cycler.

The physical exam showed unremarkable vital signs and no erythema or tenderness at the Tenckhoff catheter’s exit site and tunnel. Diffuse mild abdominal tenderness was denoted with moderate, symmetrical edema of the lower limbs. The dialysis effluent was citrine-coloured and markedly cloudy. Initial workup revealed hemoglobin of 9.8 g/dL, a white blood cell count of 7,400/μL with an absolute neutrophil count of 5,630/μL, mildly increased C-reactive protein of 3.55 mg/dL, and lactate dehydrogenase of 232 UI/L. Dialysis effluent (after a 2-h dwell) showed a white cell count of 1,150/μL with 70% polymorphonuclear.

A diagnosis of PD-associated peritonitis was made. The patient started empirical treatment with IP cefazolin and ceftazidime (125 mg/L) on continuous ambulatory PD with high concentration glucose solutions on short dwells. On day 3, she presented with improved symptoms, clear PD fluid with a white cell count of 389/μL after a 2-h dwell, and a PD fluid culture identified gram-negative cocci. Blood cultures were negative. IP antibiotics were switched to ceftazidime alone, to which the patient still had an excellent response. On day 6, the gram-negative coccus L. mirabilis was identified in the PD fluid. Unfortunately, the antimicrobial susceptibility testing could not be performed due to insufficient growth. At this point, the patient stated having had a painful periodontal infection with no fever, successfully treated with over-the-counter amoxicillin-clavulanate, 2 weeks before the clinically overt peritonitis. Regrettably, she was not subject to culture tests at the time.

The patient was maintained on the same antibiotic regimen with IP ceftazidime for 14 days and exhibited complete recovery, with no relapse or repeat peritonitis, returning to the previous PD protocol with good ultrafiltration and efficiency. She underwent PD retraining and has been peritonitis-free thereafter.

Discussion/Conclusion

To the extent of our knowledge, we present the second ever case of L. mirabilis PD-associated peritonitis, successfully treated with IP ceftazidime for 2 weeks. Despite the current peritonitis guidelines from the International Society for Peritoneal Dialysis (ISPD) [7] suggesting a 3-week treatment for non-Pseudomonas gram-negative (NPGN) peritonitis, we opted to treat for 14 days given the unclear pathogenesis of L. mirabilis, along with a mild clinical picture and excellent response to treatment after 72 h. NPGN PD-associated peritonitis has
been associated with worse outcomes than gram-positive peritonitis, with higher risks of death, relapsing infection, catheter loss, and transfer to hemodialysis [8, 9]. In our case, the patient presented with none of the above.

Despite the lack of *L. mirabilis* isolate in the mouth, the clinical history and absence of bacteremia suggest that droplets or touch contamination may have been the vector from the oral cavity to the peritoneal cavity. Even so, confirmation of the mechanism of infection remains uncertain.

Another important consideration regarding the pathogenicity of *L. mirabilis* is that the previous reports of infections occurred in patients with chronic, debilitating illnesses, in which the end-stage chronic kidney disease stands. This may underlie a lesser virulence potential of this bacterium or dependence on other unknown host factors.

We present an exceedingly rare case of *L. mirabilis* PD-associated peritonitis, successfully treated with IP antibiotics. Even though the pathogenicity of this bacterium is incompletely understood, this case highlights that it does have a pathogenic potential in PD patients. Further studies are necessary to define host susceptibility factors along with refractory and relapsing rates to better define this species’ pathogenic spectrum. Nevertheless, nephrologists should consider this organism as a cause of PD-associated peritonitis and should thoroughly inspect the oral cavity of patients suspected of having peritonitis.

**Statement of Ethics**

Written informed consent was obtained from the patient for publication of the details of their medical case and any accompanying images. Ethical approval is not required for this study in accordance with local or national guidelines.

**Conflict of Interest Statement**

The authors have no conflicts of interest to declare.

**Funding Sources**

This manuscript did not receive funding sources.

**Author Contributions**

Gonçalo Calheiros Cruz wrote the manuscript; Fernando Teixeira e Costa and Francisco Jorge Silva supervised and corrected the manuscript; Gonçalo Calheiros Cruz, Mariana Sousa, and Sara Vilela were the doctors in charge of the patient; Gonçalo Calheiros Cruz, Mariana Sousa, Sara Vilela, Fernando Teixeira e Costa, and Francisco Jorge Silva read and approved the manuscript.

**Data Availability Statement**

All data analyzed in this study are included in the manuscript. Further inquiries can be directed to the corresponding author.
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