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REFRACTORY PERITONEAL DIALYSIS PERITONITIS DUE to *PHYTOBACTER ursingii*: A CASE REPORT

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ABSTRACT

Background: Continuous ambulatory peritoneal dialysis (CAPD) related peritonitis is a main risk factor for poor technique and patient survival. Emerging pathogens causing human infections are on the rise. We report the 1st case of CAPD peritonitis due to *Phytobacter ursingii.*

Case report: A middle-aged man with end-stage kidney disease secondary to type 2 diabetes mellitus and metabolic syndrome, on CAPD since July 2023, was admitted in November 2024 for peritonitis. He had two prior episodes of *Methicillin-resistant Staphylococcus epidermidis* peritonitis in July and October 2024, both treated successfully with intraperitoneal (IP) vancomycin.

During this admission, he presented with cloudy dialysate, abdominal pain, and diarrhoea, fulfilling ISPD criteria for peritonitis. Risk factors included poor glycaemic control, possible breach in aseptic technique, mild hypokalaemia, and recent hospitalisation. Initial blood work revealed leukocytes of 5200 cells/mm3, haemoglobin 8.3 g/dL, CRP 183 mg/dL, potassium 3.5 mmol/L, and albumin 33 g/L. He was empirically started on IP vancomycin and ceftazidime.

On day 4, PD fluid culture identified *Phytobacter ursingii,* a rare emerging gram-negative pathogen, sensitive to ceftazidime and other beta-lactams shown in Table 1. The colonies were then identified as *Phytobacter ursingii* using the Bruker Matrix-Assisted Laser Desorption/ Ionization Time of Flight mass spectrometry (MALDI-ToF MS) system. Despite targeted therapy, his PD fluid remained turbid, suggesting refractory peritonitis. Daily cell counts shown in Table 2. PD catheter was removed on day 8.

The patient transitioned temporarily to haemodialysis and completed a 2-week course of intravenous ceftazidime. Six weeks later, a new PD catheter was inserted via peritoneoscopic method, with minimal adhesions observed. He resumed CAPD without complications and no signs of ultrafiltration failure.

Conclusion: This case report highlights *Phytobacter ursingii* as an emerging pathogen in peritoneal dialysis and technique survival is feasible despite refractory peritonitis.

KEYWORDS

CAPD peritonitis, Phytobacter peritonitis, Phytobacter ursingii, PD peritonitis, Phytobacter ursingii infection, refractory Phytobacter peritonitis

INTRODUCTION

The number of patients requiring long-term dialysis has risen exponentially over the past two decades[1-2], leading to increased adoption of peritoneal dialysis (PD) as a preferred modality of renal replacement therapy. However, PD-related peritonitis remains a major barrier, contributing significantly to reduced technique longevity and patient survival.[3-6]

The emergence of new opportunistic infections in PD peritonitis is on the rise, highlighting the importance of sharing clinical experiences to guide management. Here, we report the first documented case of *Phytobacter ursingii* PD peritonitis and describe our approach to its management.

CASE REPORT

A middle age man with end-stage kidney disease since 2023 was admitted to the ward for continuous ambulatory peritoneal dialysis (CAPD) peritonitis in November 2024. His primary disease is Type 2 Diabetes Mellitus since the age of 29 and he also has metabolic syndrome. Coiled peritoneal dialysis(PD) catheter was inserted via peritoneoscope in July 2023 and his dialysis commenced thereafter.

Prior to his current admission, he had two episodes on Methicillin Resistant Staphylococcus epidermidis CAPD peritonitis three months apart of each other (July and October 2024). He was successfully treated with intraperitoneal (IP) Vancomycin and achieved medical cure.

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He was admitted with cloudy PD dialysate, abdominal pain and diarrhoea and fulfilled ISPD peritonitis criteria. Several risk factors for his peritonitis include poor diabetic control, breach in aseptic technique, mild hypokalemia, and recent hospital admission.

His bloods results revealed white blood cell of 5200 cells/mm3, hemoglobin of 8.3 g/dl and elevated C-reactive protein at 183 mg/dl. His potassium was 3.5 mmol/L and albumin 33 g/L. He was empirically started on IP vancomycin and ceftazidime. On day 4 of treatment, his PD dialysate grew *Phytobacter ursingii* sensitive to amoxicillin-clavunate, cefotaxime and ceftazidime. He was continued on IP ceftazidime. His daily cell count was quantified as seen in table 1. PD fluid remained turbid despite being on the appropriate antibiotics and correct dosage for 7 days. PD catheter was removed for refractory PD peritonitis on day 8 of antibiotics.

Day	Cell count / mm^3	Neutrophils (%)
1	>1000	100
2	>1000	100
3	Not suitable for analysis – fibrin clots seen	-
4	Not suitable for analysis – fibrin clots seen	-
5	600	90
6	20	100
7	100	100

Table 1: *Daily cell count during admission*

Post PD catheter removal, patient underwent temporary haemodialysis and IV ceftazidime was completed for 2 weeks. Patient was keen to pursue CAPD and a new PD catheter was inserted for him via peritoneoscope method six weeks later. Only minimal adhesions were observed during insertion procedure. He has since continued on CAPD with adequate ultrafiltration and no evidence of ultrafiltration failure.

CULTURE

Growth was detected after 7 hours of incubation in BD BACTEC ™ FX blood culture system. The Gram stain revealed Gram-negative rods, and the sample was subsequently cultured on sheep blood agar (SBA) and MacConkey agar. After 18 hours of incubation, pure growth of greyish, smooth colonies seen on SBA (Figure 1) and lactose fermenter colonies were observed on MacConkey Agar (Figure 2). The colonies were then identified as *Phytobacter ursingii* using the Bruker Matrix-Assisted Laser Desorption/Ionization Time of Flight mass spectrometry (MALDI-ToF MS) system. Susceptibility testing was conducted using disc diffusion method. The breakpoints were those established by the Clinical and Laboratory Standards Institute for Enterobacterales .The result showed pan sensitivity towards antibiotics tested (Table 2).

ANTIBIOTIC	RESULT	ANTIBIOTIC	RESULT
Ampicillin	Susceptible	Cefepime	Susceptible
Amoxicillin/clavulanate	Susceptible	Trimethoprim - sulfamethoxazole	Susceptible
Ampicillin/sulbactam	Susceptible	Gentamicin	Susceptible
Piperacillin/tazobactam	Susceptible	Amikacin	Susceptible
Cefazolin	Susceptible	Ciprofloxacin	Susceptible
Cefuroxime	Susceptible	Ertapenem	Susceptible
Cefotaxime	Susceptible	Imipenem	Susceptible
Ceftazidime	Susceptible	Meropenem	Susceptible

Table 2: *Susceptibility towards various antibiotics*

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Figure 1: *Colonies on Blood agar*

Figure 2: *Colonies on MacConkey agar*

DISCUSSION

Phytobacter spp. are Gram-negative, lactose-fermenting, facultative anaerobes belonging to the *Enterobacteriaceae* family.[7] They are not part of the normal human flora and are primarily known as plant growth promoters. Accurate identification of these organisms remains challenging due to taxonomic complexity and limitations in laboratory identification methods.[8, 9] This difficulty is reflected in past outbreaks initially misidentified as *Pantoea* spp., including a severe neonatal ICU outbreak in Brazil prior to the official recognition of *Phytobacter*.[8, 10-12]

Identification of this genus has consistently been challenging; even modern methods like MALDI-ToF MS are limited unless the system is updated with the latest database.[13] In our case, the organism was accurately identified as *Phytobacter ursingii* using a MALDI-ToF database updated in 2023. While whole-genome sequencing and 16S rRNA sequencing offer greater accuracy, they remain costly and are not widely accessible in routine clinical practice.

Although *Phytobacter* spp. have been reported in human infections, *Phytobacter ursingii* remains extremely rare, with only three documented cases to date.[7, 10, 14] Interestingly, all previous cases involved parenteral nutrition infusion, considered a direct or indirect source of infection. In our case, no link to intravenous infusions was identified; however, we suspect nosocomial transmission as a potential common factor across all reported cases.

To the best of our knowledge, this is the first reported case of peritoneal dialysis (PD) peritonitis caused by *Phytobacter ursingii.* We suspect the infection was acquired either during a hospital stay or through a breach in aseptic technique, as the patient admitted to occasionally performing exchanges in the back seat of a car while traveling. Although *Phytobacter* spp. are environmental organisms, the growing number of healthcare-associated cases supports the likelihood of nosocomial transmission in this instance.[8-10]

Despite the organism being pan-sensitive, the patient's PD effluent remained turbid on day 7 of appropriate antibiotic therapy, raising the possibility of biofilm formation on the catheter. The patient reported hearing impairment over the past 6 months. This raised concerns about possible ototoxicity from frusemide; therefore, we avoided adding a second potentially ototoxic antibiotic such as an aminoglycoside until the cause of the hearing impairment was clarified. We were also uncertain whether adding a second antibiotic agent would have improved the infection, as there was no prior precedence to treating this organism causing PD peritonitis. Hence, we followed the ISPD guidelines for refractory peritonitis and the PD catheter was removed. The delay in catheter removal occurred because some of the daily PD fluid samples were unsuitable for cell count analysis. Among the analysable samples, the cell counts demonstrated a downward trend, which led us to anticipate clinical improvement; however, this did not occur. Encouragingly, no peritoneal adhesions were observed during catheter reinsertion, and the patient successfully resumed PD without evidence of ultrafiltration failure.

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CONCLUSION

This case report highlights the emergence of Phytobacter ursingii as a potential pathogen in peritoneal dialysis, underscoring the need for awareness of rare and emerging organisms that may pose future challenges to PD. Importantly, it also demonstrates that both technique and patient survival remain achievable following refractory Phytobacter ursingii PD peritonitis with timely intervention and adherence to established management guidelines.

DATA AVAILABILITY

No datasets were generated or analysed during the current study.

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There were no funds involved in the writing of this case report.

ETHICAL DECLARATIONS

All procedures performed in studies involving human participants were conducted in accordance with the ethical standards of the institutional and/or national research committee, as well as the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. NMRR ID-25-02904-TQK

CONSENT FOR PUBLICATION

Informed consent was obtained from the patient for the publication of this case report.

COMPETING INTERESTS

The authors declare no competing interests.

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