เยื่อบุช่องท้องอักเสบในผู้ป่วยล้างไตทางช่องท้องจากเชื้อไซโครแบคเทอร์ฟินิลไพรูวิคัส: รายงานผู้ป่วย 1 ราย

ศิรยุสม์ วรามิตร พ.บ.
กลุ่มงานอายุรกรรม โรงพยาบาลสกลนคร ตำบลธาตุเชิงชุม
อำเภอเมืองสกลนคร สกลนคร 47000

Peritoneal Dialysis-related Peritonitis due to Psychrobacter Phenylpyruvicus: A Case Report

Sirayut Waramit, M.D.
Department of Medicine, Sakon Nakhon Hospital, That Choeng Chum,
Mueang Sakon Nakhon, Sakon Nakhon, 47000, Thailand
(E-mail: sirayusm@gmail.com)

(Received: 9 August, 2023; Revised: 23 August, 2023; Accepted: 3 January, 2024)

Abstract

A member of the genus Psychrobacter, Psychrobacter phenylpyruvicus is a Gram-negative, catalase and oxidase-positive, nonmotile bacterium. Psychrobacter phenylpyruvicus can infect people and cause endocarditis, peritonitis, and fungating lesions of the foot, however these infections are uncommon.

The patient in the current case-report was a 23-year-old female who underwent continuous ambulatory peritoneal dialysis before contracting peritonitis. She experienced stomach pain as well as hyperthermia. An abdominal dialysate analysis was done next to check for infection sources, and this revealed hyperleukocytosis. Psychrobacter phenylpyruvicus was detected during the solid and blood cultures' incubation. After receiving the appropriate care, the patient eventually made a full recovery.

Keywords: Psychrobacter phenylpyruvicus, Peritonitis, Peritoneal dialysis

บทคัดย่อ

เชื้อไซโครแบคเทอร์ ฟินิลไพรูวิคัส ในสกุลไซโครแบคเทอร์ เป็นแบคทีเรียชนิดแกรมลบให้ผลบวกกับคาตาเลสและออกซิเดสที่ไม่เคลื่อนที่ สามารถทำให้เกิดการติดเชื้อกับคนได้ ได้แก่ เยื่อบุหัวใจอักเสบ เยื่อบุช่องท้องอักเสบ และการติดเชื้อที่เท้า เป็นต้นอย่างไรก็ตาม การติดเชื้อเหล่านี้พบได้น้อยมาก

รายงานนี้เป็นผู้ป่วยหญิงอายุ 23 ปี ที่ได้รับการบำบัดทดแทนไตด้วยการล้างไตทางช่องท้องต่อเนื่อง มีอาการปวดท้อง และมีไข้ ได้รับการสงสัยว่าท้องจะเป็นแหล่งของการติดเชื้อ การตรวจน้ำในช่องท้องพบมีจำนวนเม็ดเลือดขาวมาก การตรวจเพาะเชื้อจากสารอาหารแข็งและในเลือดพบเชื้อชนิดนี้ หลังจากได้รับการดูแลอย่างเหมาะสมผู้ป่วยหายกลับมาเป็นปกติ

คำสำคัญ: ไซโครแบคเทอร์ ฟินิลไพรูวิคัส, เยื่อบุช่องท้องอักเสบ, การล้างไตทางช่องท้อง

Introduction

A frequent peritoneal dialysis complication is peritonitis. Significant morbidity, catheter loss, hemodialysis transfer, momentary ultrafiltration loss, potential long-term membrane damage and occasionally death are all linked to peritonitis.[1] For the majority of PD-related peritonitis cases,

the PD catheter is the infection source. In the typically sterile peritoneum, the catheter offers an access point for microorganisms. The majority of PD-related peritonitis cases are caused by "touch contamination", in which the patient or their aid unintentionally breaches sterile procedure and contaminates the catheter or its connections. Both Staphylococcus aureus and coagulase-negative staphylococcal species, which frequently colonize human skin, hands and account for 50% or more of infections in most series, are among the most common pathogens.[2]

Case report

A 23-year-old unprofessional female patient with probable peritonitis due to peritoneal dialysis was admitted to the Sakon Nakhon Hospital. Due to end-stage renal disease brought on by diabetic nephropathy, the patient had been monitored at the CAPD clinic for three years. At the time of admission, she complained of stomach ache and a high temperature. The peritoneal catheter exit point seemed normal. A microscopic analysis of the fluid revealed 786 cells/l, 83% of which were polymorphonuclear cells, 10% lymphocytes and 7% monocytes. Gram staining failed to find any microorganisms. Her white blood cell count was 12,892/m^3, with 92% polymorphonuclear cells and her C-reactive protein level was 43 mg/l (normal: 6 mg/l). With a creatinine level of 14.47 mg/dl, renal function was changed. Ceftazidime (500 mg. four times daily) and cefazolin (250 mg four times daily) were administered intraperitoneally to begin the empirical antibiotic therapy, resulting in rapid improvement. Unexpectedly, nothing happened. A peritoneal fluid specimen was cultured for aerobic and anaerobic organisms in solid and in broth medium. A gram-negative coccobacillus was grown in pure culture using the aerobic medium in two days later. After being subcultured for 18 hours, the bacteria expanded on blood agar and chocolate agar plates at 35.8 °C in an aerobic and CO_2 environment. Under anaerobic circumstances, there was no growth. Small Gram-negative coccobacilli were detected in the culture by Gram staining. Psychrobacter phenylpyruvicus, a gram-negative rod, was identified biochemically in the blood culture. (Figure 1 and 2)

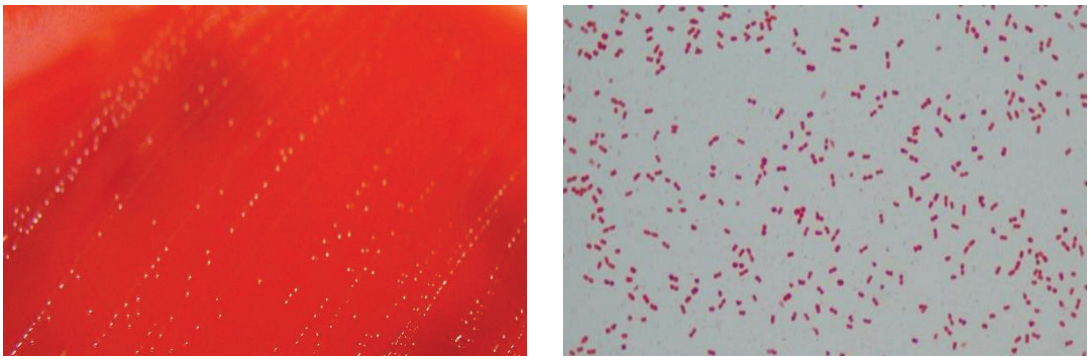

Figure 1 and 2 Colonial and microscopic morphology of Psychrobacter phenylpyruvicus

Discussion

Psychrobacter phenylpyruvicus, formerly known as Moraxella phenylpyruvica and CDC group M-2, was moved to the genus Psychrobacter in 1996.[3] Psychrobacter phenylpyruvicus has occasionally been isolated from human samples such blood, cerebrospinal fluid, vulva, ear, urine, scalp and cutaneous lesion, however these reports lack clinical descriptions and other information that would indicate the pathogenic role of this bacteria.[4]

The genus Psychrobacter contains gram-negative, spherical to rod-shaped, strictly aerobic, chemoheterotrophic, nonmotile, cold-adapted

and osmotolerant bacteria. The majority of Psychrobacter species are found in cold to warm, mildly to severely salinized environments, including glacier ice, marine ice, chilled meat, fish and clinical samples. Psychrobacter grows best at temperatures between 20 to 30 °C, with a range of -18 and 37 °C. In the common biochemical assays used to identify bacteria, psychrobacters are rather inactive. As a result, widely used commercial identification tests cannot distinguish between Psychrobacter isolates. After recent thorough bacterial isolation experiments in a variety of contexts together with 16S rRNA gene sequencing, the genus has only lately gained further recognition. Additionally, this genus is well-known for its radiation resistance. Psychrobacters thrive on mineral and complex media with a single source of carbon and energy, with ammonium salts serving as the nitrogen supply. It is obvious that Psychrobacter is a common and successfully evolving bacterial genus, and that studying its biology may shed light on critical questions of environmental adaptability and survival.

It is extremely uncommon for Psychrobacter phenylpyruvicus to infect humans. There have only been six cases of Psychrobacter phenylpyruvicus infections previously reported: a diabetic foot[5], two infected endocarditis[6, 7], a surgical wound[8], a septic arthritis patient[9] and a patient with bacteremia after eating raw shellfish.[10] (Table 1) Penicillin, ampicillin, cephalosporins, tetracyclines, macrolides, aminoglycosides and fluoroquinolones are the most common medications that Psychrobacter phenylpyruvicus is susceptible to. However, strains that produce β-lactamase have been found. Therefore, it is advisable to check for the synthesis of β-lactamase in isolates that are clinically significant.

Table 1 Previous report cases of Psychrobacter phenylpyruvicus infection

Case	Reporter	Year	Gender	Age (years)	Disease	Treatment	Outcome
1	Kikuchi,et al.	1978	Male	63	Foot abscess	Antibiotics and surgery	Cured
2	Tripodi,et al.	2002	Male	50	Endocarditis	Antibiotics and surgery	Cured
3	Guttigoli,et al.	2000	Male	43	Endocarditis	Antibiotics and surgery	Cured
4	Stepanović,et al.	2007	Female	67	Surgical wound	Antibiotics and surgery	Cured
5	Carlos,et al.	2002	Male	70	Septic arthritis	Antibiotics and surgery	Arrest
6	Leung,et al.	2006	Male	62	Bacteremia	Antibiotics	Cured

We described a 23-year-old woman who was receiving continuous ambulatory peritoneal dialysis and had end-stage renal disease as her underlying condition. She had a three-day history of fever and stomach pain when she was taken to the hospital. Psychrobacter phenylpyruvicus, which was sensitive to the majority of antimicrobial drugs, was grown in peritoneal fluid cultures. (Table 2) The intraperitoneal antibiotics had a quick effect on the patient. After beginning treatment with ceftazidime and cefazolin, the patient was cured after two weeks. This unusual report of a human infection highlights the potential health risks of peritoneal dialysis for people with end-stage renal failure.

Table 2 Sensitivity of antimicrobial drugs to Psychrobacter phenylpyruvicus

Piperacillin	Cefotaxime	Ceftazidime	Meropenem	Gentamicin	Amikacin	Ciprofloxacin
S	S	S	S	S	S	R

S = Sensitivity, R = Resistance

Conclusion

Psychrobacter phenylpyruvicus is considered as unusual cause of peritoneal dialysis-related peritonitis. In this report, we described culture positive patients with Psychrobacter phenylpyruvicus presenting with peritonitis manifestations at a single tertiary health care center, in northeast Thailand.

Reference

1. Ghali JR, Bannister KM, Brown FG, Rosman JB, Wiggins KJ, Johnson DW, et al. Microbiology and outcomes of peritonitis in Australian peritoneal dialysis patients. Perit Dial Int 2011;31(6):651-62.
2. Li PK, Chow KM, Cho Y, Fan S, Figueiredo AE, Harris T, et al. ISPD peritonitis guideline recommendations: 2022 update on prevention and treatment. Perit Dial Int 2022;42(2):110-53.
3. Bowman JP, Cavanagh J, Austin JJ, Sanderson K. Novel Psychrobacter species from Antarctic ornithogenic soils. Int J Syst Bacteriol 1996;46(4):841-8.
4. Deschaght P, Janssens M, Vaneechoutte M, Wauters G. Psychrobacter isolates of human origin, other than Psychrobacter phenylpyru vicus, are predominantly Psychrobacter faecalis and Psychrobacter pulmonis, with emended description of P. faecalis. Int J Syst Evol Microbiol 2012;62(Pt 3):671-4.
5. Kikuchi I, Arao T, Oiwa T. Surgical treatment of fungating lesion of foot due to Moraxella phenylpyruvica. Case report. Plast Reconstr Surg 1978;61(6):911-6.
6. Tripodi MF, Adinolfi LE, Rosario P, Ragone E, Utili R. First definite case of aortic valve endocarditis due to Moraxella phenylpyruvica. Eur J Clin Microbiol Infect Dis 2002;21(6):480-2.
7. Guttigoli A, Zaman MM. Bacteremia and possible endocarditis caused by Moraxella phenylpyruvica. South Med J 2000;93(7):708-9.
8. Stepanović S, Vuković D, Bedora-Faure M, K'ouas G, Djukić S, Svabić-Vlahović M, et al. Surgical wound infection associated with Psychrobacter phenylpyruvicus-like organism. Diagn Microbiol Infect Dis 2007;57(2): 217-9.
9. Carlos PC, Alvaro RG, René BB, Patricia GC. Septic arthritis due to Psychrobacter phenylpyruvicus: First case and literature review. Rev Chile Infectol 2021;19(2):96-100.
10. Leung WK, Chow VC, Chan MC, Ling JM, Sung JJ. Psychrobacter bacteraemia in a cirrhotic patient after the consumption of raw geoduck clam. J Infect 2006; 52(6):e169-71.