

Hemodialysis Catheter-Related Infection Accompanied by Liver Dysfunction Caused by *Pannonibacter phragmitetus*: A Case Report

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Case Report

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Abstract

Background

Human infections with *Pannonibacter phragmitetus* (*P. phragmitetus*) are uncommon. We report a case of catheter-related infection caused by this organism accompanied by liver function abnormalities.

Case presentation

: A 62-year-old female patient on maintenance hemodialysis presented with recurrent fever after hemodialysis. *Pannonibacter phragmitetus* was repeatedly isolated from blood cultures. After intravenous piperacillin-tazobactam therapy, the patient's body temperature returned to normal. The infected catheter was immediately removed, and a new catheter was re-inserted at a different site. The patient achieved full recovery during the 2-month follow-up.

Conclusion

For catheter-related infections caused by rare environmental bacteria, individualized anti-infective regimens should be implemented by comprehensively considering antimicrobial susceptibility results, infection site, control of infectious foci, catheter management, and clinical response, so as to enhance therapeutic efficacy and improve prognosis.

Introduction

Pannonibacter phragmitetus (*P. phragmitetus*) is a facultatively anaerobic, Gram-negative environmental bacillus first recovered from reed rhizomes of Hungarian soda lakes^[1]. It possesses excellent capacities for denitrification, heavy metal reduction and polycyclic aromatic hydrocarbon degradation for environmental remediation applications. It is not a typical human pathogen, with very few human infection cases reported worldwide. Up to now, seven human *P. phragmitetus* infections have been published, including one prosthetic valve endocarditis^[2], two episodes of sepsis^[3], one recurrent sepsis^[4], one liver abscess^[5], and two hemodialysis catheter infections^[6, 7]. Due to its multidrug resistance, clinicians should stay alert to this uncommon pathogen^[8]. We describe a case of *P. phragmitetus*-induced hemodialysis catheter infection complicated with liver dysfunction.

Case presentation

A 62-year-old female with end-stage renal disease underwent maintenance hemodialysis three times per week through an indwelling cuffed catheter in the right internal jugular vein at a local medical institution. Her past medical history comprised chronic renal insufficiency progressing to uremia, chronic renal failure, renal anemia, hypocalcemia, and microcytic hypochromic anemia. The patient was hospitalized

on April 20, 2026, with a 1-week history of recurrent post-hemodialysis fever. Her fever subsided after physical cooling, which led her to delay medical evaluation and treatment prior to admission.

Upon admission, the patient's vital signs were recorded as follows: body temperature 37.4°C, pulse 90 beats per minute, respiratory rate 21 breaths per minute, and blood pressure 115/60 mmHg. After admission, comprehensive laboratory tests were performed (Table 1), which revealed evidence of infection: high-sensitivity C-reactive protein (hs-CRP) 10.90 mg/L, erythrocyte sedimentation rate (ESR) 26 mm/h; moderate anemia: red blood cell count $2.18 \times 10^{12}/L$, hemoglobin 84 g/L; hypocalcemia: serum calcium 1.96 mmol/L; hepatic dysfunction: alanine aminotransferase (ALT) 78 U/L, aspartate aminotransferase (AST) 87 U/L, total bile acid 13.4 $\mu\text{mol}/L$; renal insufficiency: serum creatinine 382.0 $\mu\text{mol}/L$, blood urea nitrogen 11.19 mmol/L, β_2 -microglobulin 16.45 mg/L; hypercholesterolemia: total cholesterol 5.88 mmol/L; and hyperparathyroidism: parathyroid hormone (PTH) 118.77 pg/mL.

Table 1
Abnormal diagnostic results.

Parameter	Values	Normal range
hs-CRP(mg/L)	10.90	0.00 ~ 10.0
ESR(mm/h)	26	0 ~ 20
RBC($10^{12}/L$)	2.80	3.80 ~ 5.10
HGB(g/L)	84	115 ~ 150
HCT(%)	27	30 ~ 45
ALB(g/L)	38.8	40.0 ~ 50.0
PH	7.49	7.35 ~ 7.45
PCO ₂ (mmHg)	34.9	35.0 ~ 45.0
PO ₂ (mmHg)	78.2	80.0 ~ 100.0
ctO ₂ (mL/dL)	12.7	7.6 ~ 10.3
RBP(mg/L)	111.3	25.0 ~ 70.0
ALT(U/L)	78	7 ~ 40
AST(U/L)	87	13 ~ 35
ALP(U/L)	161	50 ~ 135
GGT(U/L)	198	7 ~ 45
TBA(μ mol/L)	13.4	0.0 ~ 12.0
CREA(μ mol/L)	382.0	17.1 ~ 107
UREA(mmol/L)	11.19	3.10 ~ 8.80
β 2-MG(mg/L)	16.45	1.30 ~ 3.00
CHO(mmol/L)	5.88	3.10 ~ 5.20
Ca(mmol/L)	1.96	2.11 ~ 2.52
PHT(pg/mL)	118.77	11.00 ~ 81.00
D-Dimer(ug/ml)	0.87	0.00 ~ 0.50
PT(s)	10.80	11.00 ~ 16.00

hs-CRP,high-sensitivity C-reactive protein;ESR,erythrocyte sedimentation rate;RBC,red blood cell;HGB,hemoglobin; HCT,hematocrit;ALB,albumin;PH,potential of hydrogen;PCO₂,partial pressure of

carbon dioxide;PO₂,partial pressure of oxygen;ctO₂,arterial oxygen content;RBP,retinol-binding protein;ALT,alanine aminotransferase;AST,aspartate aminotransferase;ALP,alkaline phosphatase;GGT,gamma-glutamyl transferase;TBA,total bile acid;CREA,creatinine;UREA,urea;β₂-MG,beta-2-microglobulin;CHO,total cholesterol;Ca,calcium ion;PTH,parathyroid hormone;D-Dimer,D-dimer;PT,parathyroid hormone.

On the day of admission, the patient developed recurrent fever following routine hemodialysis, with a maximum temperature of 38.6°C and fluctuations ranging from 37.4°C to 38.6°C. She had no cough, expectoration, dysuria, frequent micturition, urgent micturition, abdominal pain or diarrhea. Given the clinical suspicion of catheter-related bloodstream infection (CRBSI), one peripheral venous blood sample and one blood sample drawn from the catheter lumen were collected prior to antimicrobial administration for aerobic and anaerobic blood culture and bacterial identification. Empirical intravenous therapy with piperacillin sodium/tazobactam sodium (2.25 g twice daily) was initiated immediately.

On the second day after admission, following the return of laboratory results, anti-infective treatment was continued, and bifendate (25 mg three times daily) was administered for hepatoprotection and transaminase reduction as symptomatic management. After the initiation of antibiotics, the patient's body temperature dropped to 36.8°C. Although the patient's clinical manifestations improved, catheter-related infection was still diagnosed in accordance with clinical guidelines^[9]: the patient presented with elevated inflammatory markers and recurrent fever exceeding 38°C, and no other definite infectious focus was identified apart from the intravascular catheter. After communication with the patient and her family members, the right internal jugular venous catheter was removed. Catheter tip culture of the removed catheter was performed, and a new catheter was placed in the left internal jugular vein. Heparin solution was used for catheter locking following each hemodialysis session. *P. phragmitetus* was isolated from the catheter tip culture. The aerobic blood culture turned positive after 5 days of incubation, and the same pathogen, *P. phragmitetus*, was identified. Repeat cultures were performed to confirm the isolated bacterial strain. Thereafter, the patient experienced no recurrent fever following each session of regular hemodialysis, indicating effective anti-infective therapy. Therefore, intravenous piperacillin sodium/tazobactam sodium (2.25 g twice daily) was administered continuously from the day of admission until discharge, spanning a total of 14 days. The patient achieved complete recovery. During the two-month follow-up period, no febrile episodes recurred, and laboratory indicators including white blood cell count, high-sensitivity C-reactive protein (hs-CRP), alanine aminotransferase (ALT) and aspartate aminotransferase (AST) all returned to normal ranges (Table 2).

Table 2
Key Laboratory Findings During Follow-up

Parameter	Values			Normal range
	0.5 month post-treatment	1 month post-treatment	2 months post-treatment	
hs-CRP(mg/L)	2.38		3.23	0.00 ~ 10.0
WBL($10^{12}/L$)	6.59	4.75	5.63	3.50 ~ 9.50
RBC($10^{12}/L$)	2.90	3.58	3.88	3.80 ~ 5.10
HGB(g/L)	91	103	11	115 ~ 150
HCT(%)	28	34	35	30 ~ 45
ALT(U/L)	30		18	7 ~ 40
AST(U/L)	32		21	13 ~ 35
ALP(U/L)	145		136	50 ~ 135

hs-CRP,high-sensitivity C-reactive protein;RBC,red blood cell;HGB,hemoglobin; HCT ,hematocrit;ALT,alanine aminotransferase;AST,aspartate aminotransferase;ALP,alkaline phosphatase.

Discussion and Conclusions

Notably, the patient in this case presented with catheter-associated infectious fever accompanied by liver function abnormalities, and clinical symptoms improved after treatment with piperacillin/tazobactam. Previous reports have demonstrated that *P. phragmitetus* exhibits resistance to multiple antibiotics^[8]. Gallardo et al.^[6]performed antimicrobial susceptibility testing and showed that this microorganism was resistant to piperacillin/tazobactam. Tang Ruizhi et al.^[7] reported that this bacterium was resistant to penicillins (piperacillin/tazobactam). In the antimicrobial susceptibility test for liver abscess caused by *P. phragmitetus*, Wang Mingxi et al.^[5] found that the bacterium was susceptible to piperacillin/tazobactam. These findings indicate that the susceptibility of *P. phragmitetus* to piperacillin/tazobactam varies under different infectious contexts, suggesting inter-strain differences in drug resistance among this species. Furthermore, the infection site and biofilm status may influence the correlation between in-vitro antimicrobial susceptibility results and clinical therapeutic outcomes. In catheter-related infections, interventions such as catheter removal or exchange may also exert a substantial impact on prognosis. Therefore, this case cannot prove that piperacillin/tazobactam is effective against all catheter-associated *P. phragmitetus* infections. Nevertheless, it suggests that under complex clinical scenarios including liver function abnormalities, previously reported resistance data from simple catheter-isolated strains should not serve as an absolute basis for excluding this agent. For infections caused by such rare pathogens, piperacillin/tazobactam may be considered as one of the

individualized therapeutic options on the basis of supportive antimicrobial susceptibility results, control of infectious foci, and close clinical monitoring.

The patient in this case received only heparin solution for catheter locking, without antimicrobial lock therapy. Heparin mainly functions to maintain catheter patency and possesses no direct bactericidal activity; moreover, it can hardly eliminate bacterial biofilms within the catheter lumen. Therefore, heparin-only catheter locking has limitations in the prevention and control of catheter-related infections^[10]. Current clinical guidelines and expert consensus mainly recommend unfractionated sodium heparin, citrate, or antimicrobial lock solutions (e.g., ethanol) as catheter-locking agents^[11, 12]. Antimicrobial lock therapy is primarily indicated for patients with confirmed catheter-related bloodstream infections who require catheter preservation, and can serve as an adjunctive measure to systemic anti-infective therapy^[10]. The infected catheter was removed and a new catheter was re-placed at a different site in this patient; therefore, the omission of specific antimicrobial lock therapy was reasonable. If long-term catheter indwelling is required or the patient is at risk of recurrent catheter-related infections in the follow-up period, appropriate antimicrobial lock solutions for catheter locking may be considered following comprehensive assessment of catheter type, etiological findings and safety profiles.

In conclusion, for catheter-related infections caused by rare environmental bacteria, comprehensive assessment based on antimicrobial susceptibility results, infection site, control of infectious foci, catheter-management strategies, and the patient's clinical response should be performed to guide individualized anti-infective therapy.

Declarations

Tongchuan District People's Hospital, Dazhou City (Ethics approval number: 2026-008). Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Ethics approval and consent to participate

This report was conducted in accordance with the principles of the Declaration of Helsinki. The report protocol was approved by the Ethics Committee of

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Competing interests

The authors declare that they have no competing interests.

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Author Contribution

G collected clinical data and drafted the manuscript. M participated in manuscript revision. L supervised the whole work. All authors read and approved the final manuscript.

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Availability of data and materials

Data sharing is not applicable to this article as no datasets were generated or analysed during the current study.

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