

A rare case of *Streptococcus pneumoniae* urinary tract infection in a chronic hemodialysis patient

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ABSTRACT

We report a rare case of urinary tract infection (UTI) caused by *Streptococcus pneumoniae* (*S. pneumoniae*) in a chronic hemodialysis (HD) patient with a long-standing tunneled dialysis catheter. A 28-year-old female on thrice-weekly HD developed dysuria accompanied by genital pruritus. Urinalysis demonstrated leukocyturia and hematuria, and urine culture yielded *S. pneumoniae*. She had no systemic signs of infection but exhibited elevated C-reactive protein (CRP) levels. Based on antimicrobial susceptibility testing, a 7-day course of ceftriaxone 1000 milligram (mg) resulted in culture negativity. This case highlights the need to consider unusual pathogens in UTIs with complex urogenital risk factors.

Keywords: *Streptococcus pneumoniae*, urinary tract infection, hemodialysis

INTRODUCTION

S. pneumoniae (*S. pneumoniae*) is a gram-positive bacterium that is most commonly linked with respiratory infections such as pneumonia and otitis media, and life-threatening infections such as meningitis and bacteremia.¹ It has not been commonly associated with UTIs. It has rarely been isolated from urine cultures in both adults and children.² The isolation of this pathogen has been noted at low rates of ~0.18% in adults and ~0.08% in pediatrics, prompting debate on its clinical importance.³ Its isolation has been noted from individuals with urinary abnormalities and other predisposing factors.⁴ There is further controversy due to the possibility of contamination or pneumococcosuria without actual infection.

In view of the low rates of isolation and sparse literature on *S. pneumoniae* being a uropathogen, particularly in immunocompromised or chronic illness settings such as HD, awareness among clinicians plays an essential role in diagnosing and treating this condition appropriately.

CASE

A 28-year-old female with end-stage renal disease (ESRD) receiving maintenance HD three times weekly through a tunneled dialysis catheter complained of dysuria, urinary pruritus, and discomfort while urinating. She denied fever, chills, rigors, flank pain, and other systemic complaints. She had a history of ESRD on chronic HD but no history of urogenital tract abnormalities.

Vital signs were within normal limits. Urinalysis revealed pyuria and microscopic hematuria. In addition, laboratory investigations demonstrated evidence of infection, with

elevated inflammatory markers in the blood and significant pyuria on urinalysis (**Table 1**). The patient had no respiratory symptoms, and the posteroanterior chest radiograph was unremarkable. Simultaneous blood cultures obtained from the tunneled catheter and peripheral vein were negative.

Table 1. Key laboratory and microbiological findings

Parameters	Value	Reference range
White blood cell count (×10 ³ /L)	12.56	4.0-10.0
Hemoglobin (g/dl)	12.5	12.0-16.0
Platelet count (×10 ³ /L)	225	150-400
C-reactive protein (mg/L)	58	<5
Blood urea nitrogen (mg/dl)	106	9-23
Serum creatinine (mg/dl)	13.09	0.5-1.1
Urine leukocytes (/HPF)	38	0-5
Urine erythrocytes (/HPF)	8	0-3

HPF: High-power field

The patient had a daily residual urine output of approximately 200-300 ml. To minimize the risk of contamination, the urine sample for culture was collected under sterile conditions using a clean-catch midstream urine specimen. Urine culture yielded pure growth of *S. pneumoniae* at a concentration >10⁵ CFU/ml. To confirm the diagnosis, a repeat urine specimen collected the following day was cultured and demonstrated pure growth of *S. pneumoniae* at the same concentration. Antimicrobial susceptibility testing was performed and reported in accordance with European Committee on Antimicrobial Susceptibility Testing (EUCAST) standards (**Table 2**). After a 7-day course of ceftriaxone 1000 milligram

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(mg) therapy, the urine culture was sterile and clinical symptoms improved.

Table 2. Identification and antimicrobial susceptibility results of the *Streptococcus pneumoniae* isolates

Test	Interpretation
Optochin	S
Bile solubility	Positive
Oxacillin (1 µg)	R
Benzylpenicillin	I
Cefotaxime	S
Ceftriaxone	S
Cefepime	S
Erythromycin	S
Clindamycin	S
Cotrimoxazole	S
Levofloxacin	S
Vancomycin	S
Linezolid	S

S: Susceptible, I: Intermediate, R: Resistant

DISCUSSION

S. pneumoniae is typically associated with respiratory infections and serious diseases, but its involvement in UTIs is infrequent and not well-documented.⁵ In many microbiological studies, finding pneumococcus in urine cultures is rare, and it is important to determine if the presence of bacteria is due to contamination, colonization (referred to as “pneumococcosuria”), or an actual infection.⁶ Various observational studies and case reports have shown that pneumococcus can be found in urine, particularly in patients with urinary tract structural issues, underlying renal disease, or a history of recurrent UTIs, indicating that certain factors may allow this uncommon pathogen to invade or colonize the urinary tract. One laboratory study identified *S. pneumoniae* in a small number of urine samples out of 110,000 collected over five years, affecting both children and adults, especially those with kidney dysfunction or those who had undergone kidney transplants.⁷

Although the patient reported genital pruritus and dysuria at presentation, no formal gynecological evaluation was performed because there were no accompanying findings suggestive of a gynecological infection. The absence of a gynecological examination should therefore be acknowledged as a limitation of this case. Elevated CRP levels are relatively common among patients undergoing chronic HD and are not specific for urinary tract infection. Therefore, in this case, the elevated CRP level should be interpreted cautiously and was not considered a specific indicator of infection.

Correct diagnosis relies on identifying significant bacteriuria, having supportive symptoms, and ruling out contamination. Treatment should be based on susceptibility testing, as pneumococcal strains can show different resistance patterns. This case highlights the importance of considering rare pathogens like *S. pneumoniae* in high-risk patients who show urinary symptoms, particularly when cultures repeatedly identify the same organism and clinical evidence suggests an infection rather than simple colonization.

CONCLUSION

Although rare, *S. pneumoniae* should be considered a potential causative pathogen in UTIs in patients who have certain risk factors, like having HD access devices or structural issues in the urinary system. Diagnosis and treatment should be based on the patient's symptoms and the bacteria's resistance to antibiotics.

ETHICAL DECLARATIONS

Informed Consent

Written informed consent was obtained from the patient included in this report. Signed consent forms are retained by the authors and are available upon request.

Peer Review Process

This report underwent external peer review.

Conflict of Interest

The authors declare no conflicts of interest.

Financial Disclosure

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Author Contributions

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