



***Streptococcus pneumoniae* as an Etiology of Urinary Tract Infection in a Patient with Obstructive Uropathy and Chronic Kidney Disease: A Rare Case Report**

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Abstract

Streptococcus pneumoniae is an exceptionally uncommon cause of urinary tract infection (UTI) in adults and is often dismissed as a contaminant when isolated from urine specimens. Structural abnormalities of the urinary tract and impaired host immunity may predispose to infection with such atypical pathogens. A 70-year-old hypertensive male with benign prostatic enlargement (BPE), obstructive uropathy, and chronic kidney disease (CKD) presented with fever, urinary incontinence, and flank pain. Urinalysis demonstrated marked pyuria, and urine culture yielded pure growth of *S. pneumoniae* at a colony count of 1×10^5 CFU/mL. The isolate was susceptible to all tested antimicrobial agents. Laboratory evaluation revealed a leukocyte count of $8.9 \times 10^3/\mu\text{L}$ with neutrophilic predominance and a serum creatinine level of 2.07 mg/dL. Ultrasonography showed BPE with bilateral hydronephrosis. The patient responded favorably to amoxycyclav and urological management. This report highlights *S. pneumoniae* as a rare but clinically significant uropathogen in elderly patients with obstructive uropathy and CKD. Recognition of pneumococci as true urinary pathogens in appropriate clinical settings is essential to ensure timely diagnosis and targeted therapy.

Keywords: *Streptococcus pneumoniae*; urinary tract infection; obstructive uropathy; benign prostatic enlargement; chronic kidney disease

Bangladesh Journal of Medical Microbiology, January 2026;20 (1):66-69

Introduction

Urinary tract infections are predominantly caused by Gram-negative bacilli, while Gram-positive organisms such as *Streptococcus pneumoniae* rarely account for clinically significant UTIs in adults. Pneumococci isolated from urine are frequently regarded as periurethral contaminants rather than true pathogens. However, accumulating evidence indicates that pneumococcal UTI may occur in the presence of urinary tract obstruction, urinary stasis, or impaired host immunity^{1,2,3}.

Benign prostatic enlargement is a common cause of

obstructive uropathy in elderly men and predisposes to complicated UTI through incomplete bladder emptying and increased postvoid residual urine volume. Chronic kidney disease further compromises innate and adaptive immune responses, increasing susceptibility to infection by unusual organisms. We report a rare case of pneumococcal UTI in an elderly male with BPE and CKD, underscoring the importance of careful clinicomicrobiological correlation.

Case Presentation

A 70 year old male with a history of hypertension, benign prostatic enlargement, and chronic kidney disease presented to a private tertiary care hospital with complaints of fever, urinary incontinence, and left sided flank pain. There was no history of recent urinary catheterization or urological instrumentation. On examination, the patient was febrile (101°F), with a pulse rate of 102 beats/min and blood pressure of

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DOI: <https://doi.org/10.3329/bjmm.v20i1.90297>

130/80 mmHg. Abdominal examination revealed suprapubic fullness, and left costovertebral angle tenderness was present. Digital rectal examination suggested benign prostatic enlargement without features suspicious for malignancy. Laboratory investigations showed a total leukocyte count of $8.9 \times 10^3/\mu\text{L}$ with 83% neutrophils, hemoglobin of 6.9 g/dL, and platelet count of $340 \times 10^3/\mu\text{L}$. C-reactive protein was markedly elevated (150 mg/L). Renal function tests revealed a serum creatinine level of 2.07 mg/dL with an estimated creatinine clearance of 54 mL/min. Severe anemia was attributed to CKD-associated

anemia of chronic disease. Urinalysis demonstrated significant pyuria. Ultrasonography of the abdomen revealed benign prostatic enlargement with bilateral hydronephrosis, consistent with obstructive uropathy. Prostate-specific antigen level was 2.6 ng/mL.

Microbiological Findings: Urine culture was performed according to Clinical and Laboratory Standards Institute (CLSI) guidelines using a calibrated 0.001-mL loop. The specimen was inoculated onto 5% sheep blood agar and incubated at 37°C in a 5.0% CO₂-enriched atmosphere. After 18–24 h of incubation, pure growth of faint alpha-hemolytic,

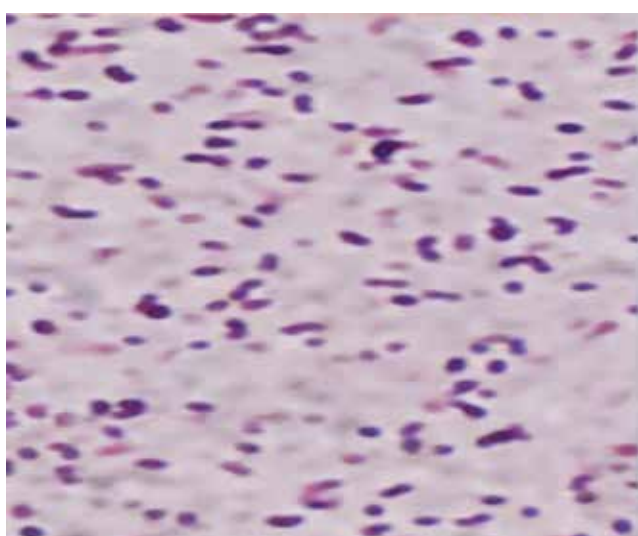


Figure I: Gram Staining Revealed Gram-Positive Diplococci



Figure II: Blood Agar Media Showing Colony of Alpha Hemolytics



Figure III: Antimicrobial Susceptibility Test

mucoid colonies was observed, corresponding to a colony count of 1×10^5 CFU/mL. Gram staining revealed Gram-positive diplococci. (Fig 1) The isolate was identified as *Streptococcus pneumoniae* based on alpha hemolysis and optochin susceptibility testing performed in a resource-limited laboratory (Figure 1). Antimicrobial susceptibility testing by the Kirby–Bauer disk diffusion method demonstrated susceptibility to penicillin, amoxycillin-clavulanic acid, vancomycin, erythromycin, linezolid, co-trimoxazole, fusidic acid, and ciprofloxacin, interpreted according to CLSI criteria (Figure III).

Management and Outcome: The patient received amoxiclav (500 mg/125 mg every 8 hours), resulting in prompt resolution of fever and urinary symptoms and was continued for 14 days. Renal function remained stable throughout hospitalization. Urological consultation recommended medical management for benign prostatic enlargement, with outpatient follow-up for possible definitive intervention if symptoms persisted.

Discussion

Pneumococcal UTI is exceedingly rare in adults, with only isolated cases reported in the literature^{1,4-7}. The urinary tract possesses several intrinsic defense mechanisms, including continuous urine flow, effective bladder emptying, and an acidic urinary pH, which inhibit the growth of *Streptococcus pneumoniae*¹. Consequently, recovery of pneumococci from urine specimens is often dismissed as contamination rather than true infection^{1,2}.

In the present case, obstructive uropathy secondary to benign prostatic enlargement resulted in urinary stasis, creating a permissive environment for bacterial persistence. Chronic kidney disease likely compounded susceptibility through impairment of host immune defenses, a recognized risk factor for complicated UTI³. Prior reports of pneumococcal UTI in both adults and children consistently identify underlying urogenital abnormalities or systemic comorbidities, supporting the pathogenic role of *Streptococcus pneumoniae* in susceptible hosts^{2,4-5}.

Although $\geq 10^5$ CFU/mL has traditionally been regarded as the threshold for significant bacteriuria, lower colony counts ($\geq 10^3$ CFU/mL) are clinically meaningful in symptomatic men, particularly in the presence of urinary tract obstruction or incomplete bladder emptying⁸. In this patient, the presence of pyuria, systemic inflammation, compatible clinical

features, and pure growth of *Streptococcus pneumoniae* strongly supported true infection rather than contamination.

Benign prostatic enlargement is a well-established risk factor for complicated UTI due to increased postvoid residual urine volume and impaired bladder emptying⁸⁻⁹. Advanced age further increases susceptibility through immunosenescence and age-related urological dysfunction⁹. Zinc deficiency, which is relatively common in elderly men, may additionally impair prostatic antibacterial activity and predispose to infection by atypical organisms¹⁰.

Despite increasing global reports of antimicrobial resistance among *Streptococcus pneumoniae*, the isolate in this case remained fully susceptible, allowing effective culture-directed therapy and a favorable clinical outcome^{6,7}. This case underscores the importance of careful microbiological interpretation and avoidance of dismissing unusual urinary isolates as contaminants in high-risk patients.

Conclusion

This case demonstrates that *Streptococcus pneumoniae* can act as a true uropathogen in elderly patients with obstructive uropathy and chronic kidney disease. Clinicians and microbiologists should consider pneumococci as potential causes of complicated UTI when supported by clinical findings, pyuria, and significant colony counts. Early recognition and targeted antimicrobial therapy are essential to prevent complications and preserve renal function.

Acknowledgements

None

Conflict of Interest

None

Financial Disclosure

Not Applicable

Authors' contributions

Dr. Sadia Sharmin & Professor S.M. Mostafa Kamal: conceptualized and designed the study, analyzed the data, interpreted the results, and wrote up the draft manuscript.

Dr. Ehsan Jalil: contributed to the data analysis, interpretation of the results, and critical review of the manuscript.

Dr. Adeeba Khanduker: contributed to the analysis of the data. All authors read and approved of the final manuscript.

Data Availability

Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate

Written consent has been taken from the patient.

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How to cite this article: Sharmin S, Jalil E, Khanduker A, Khatun S, Mondol P, Kamal SMM. Streptococcus pneumoniae as an Etiology of Urinary Tract Infection in a Patient with Obstructive Uropathy and Chronic Kidney Disease: A Rare Case Report . Bangladesh J Med Microbiol, 2026;20(1):66-69

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Article Info

Received: 7 September 2025
 Accepted: 24 October 2025
 Published: 1 January 2026

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