



# Emphysematous Urinary Tract Infections in Diabetics

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We encountered an intriguing case study by Yang et al.<sup>1</sup> detailing the medical history of an 84-year-old woman with poorly controlled type 2 diabetes mellitus (DM). She presented with concurrent infections of the urinary tract, pulmonary system, and EG.5.1 coronavirus strain. She developed sepsis caused by *Klebsiella pneumoniae*, as identified by cultures from sputum and blood samples. Imaging studies revealed pneumonia, emphysematous pyelonephritis (EPN), and cystitis (EC). Antimicrobials, specifically meropenem plus levofloxacin (later altered to voriconazole), were employed alongside comprehensive intensive therapy support. Considering the ineffectiveness of clinical control, potential management options include percutaneous nephrostomy or nephrectomy. Unfortunately, she succumbed within a week.<sup>1</sup> The authors emphasized the uncommon occurrence of bilateral EPN and its critical role as a life-threatening factor in patients with uncontrolled diabetes, compromised immunity, and urinary tract obstructive disorders. They highlighted the presence of elevated levels of proteinuria and glucosuria, which contributed to the proliferation of gas-producing bacteria.<sup>1</sup> They highlighted *Escherichia coli* and *Klebsiella pneumoniae* as the predominant pathogens causing emphysematous infections, while also commenting on *Candida albicans* and *C. glabrata* as potential secondary findings, and underscored the necessity for immediate hospitalization to minimize the risk of irremediable outcomes.<sup>1</sup> In this setting, comments are added on Indian and Brazilian articles to enhance the focus of interest.<sup>2,3</sup>

Adapala et al.<sup>2</sup> conducted a prospective 5-year evaluation of the clinical findings and outcomes of 36 cases of EPN. The management approach involved renal preservation measures, including resuscitation, antibiotic therapy, drainage of liquids and gases, and correction of urinary tract obstructions. Interestingly, the study revealed that the isolated left kidney was predominantly affected (64%), with a singular patient exhibiting bilateral disease.<sup>2</sup> The Huang and Tseng classification was employed to guide the optimized treatment options for each group of patients, characterized by an average age of  $57.5 \pm 12$  years and a female-to-male distribution

ratio of 2:1. The major predisposing factors included DM (97%) and urinary tract obstruction (75%) caused by lithiasis, calculi, papillary necrosis, strictures, or bezoars, and *E. coli* was identified as the most frequent causal agent (72%). Furthermore, the overall survival rate was 94%, with only 6% of the patients undergoing salvage nephrectomy.<sup>2</sup> It is noteworthy that the authors utilized class II of the Huang and Tseng classification, further subdivided into subgroups (<50% and >50%) based on the extent of renal parenchyma affected, and concluded that salvage nephrectomy should be reserved for cases exhibiting progressive disease and sepsis despite initial renal preservation strategies.<sup>2</sup>

Santos et al.<sup>3</sup> reported a case of a 70-year-old woman with diabetes presenting with an acute urinary infection. Imaging studies revealed EPN and EC, while urine culture detected *E. coli*. The infection was treated successfully with ciprofloxacin. An elderly patient presented with nephrolithiasis and experienced lower back pain, a fever with chills, dysuria, and pneumaturia. She also had unilateral gas in the renal pelvis and parenchyma, as well as in the urinary bladder.<sup>3</sup> The authors cited a high prevalence in females in the sixth decade of life, with type 2 diabetes identified in up to 90% of cases. Furthermore, they highlighted urinary tract obstructions as frequent predisposing factors, and *E. coli*, *Klebsiella*, *Proteus*, *Pseudomonas*, and *Candida* spp. identified as the common causal agents.<sup>3</sup> They drew attention to the Huang and Tseng classification, derived from tomography data, which included the following categories: 1) gas only in the renal collecting system; 2) gas in the renal parenchyma without extrarenal extension; 3A) gas or abscess in the perinephric area; 3B) gas or abscess in the pararenal area; and 4) presence of bilateral involvement.<sup>3</sup> The major objective of establishing an early diagnosis and prompting adequate antibiotic therapy was stressed as the best strategy to avoid the need for invasive procedures such as drainage or nephrectomy.<sup>3</sup> Hence, there is a need to enhance awareness and suspicion indices among primary healthcare professionals, achieved through widespread dissemination of individual case studies. This dissemination aims to improve the diagnostic accuracy of this rarely

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reported condition, which is particularly challenging to diagnose before obtaining high-priority abdominal imaging.<sup>3</sup>

In conclusion, a more effective prevention strategy for EPN entails managing DM and urinary infections along with prompt correction of urinary tract obstructions, particularly in the elderly. Early hospitalization is required to avoid ominous outcomes in patients presenting with oliguria. Renal function preservation should be the main objective, irrespective of disease stage or prognostic indicators.

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