

A Case of Urinary System Infection Requiring Hospitalization: Emphysematous Cystitis

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Abstract

Introduction: *This study describes the clinical course of a patient with type 2 diabetes mellitus and obesity who was diagnosed with a rare emphysematous cystitis; early and effective treatment prevented the development of sepsis and mortality.*

Case Report: *A 52-year-old female patient presented to the emergency department with complaints of fever and pain in the inguinal region. The patient had known hypertension, DM, and obesity. A physical examination revealed tenderness and defense in the right and left lower quadrants of the abdomen. Other system examinations were normal. Laboratory analyses revealed the following: CRP (C-reactive protein) 439 mg/dl, glucose 343 mg/dl, urea 95.9 mg/dl, creatinine 2.11 mg/dl; alanine aminotransferase and aspartate aminotransferase values were within normal limits. In the abdominal tomography air density was observed in the bladder lumen. She was admitted to the infectious diseases clinic with a preliminary diagnosis of urinary system infection. Hydration therapy was started 1 hour after admission to emergency department. Piperacillin tazobactam and ceftriaxone treatment was started. After 12 days of hospitalization, the patient was discharged, whose symptoms regressed without complications.*

Conclusion: *When evaluating urinary system infections in diabetic patients, EC should be included in the differential diagnosis. With hospitalization and effective treatment, the disease can be treated before it progresses to sepsis.*

Key words: *Emphysematous cystitis, urinary system infection, diabetes mellitus*

Introduction

Emphysematous cystitis (EC) is characterized by air accumulation in the bladder wall or lumen; it can be seen after urological interventional procedures and, more frequently, in patients with advanced age and diabetes mellitus (DM) (1). Early treatment is necessary to prevent the development of sepsis. This study describes the clinical course of a patient with type 2 DM and obesity who was diagnosed with a rare EC; early and effective treatment prevented the development of sepsis and mortality.

Case Report

A 52-year-old female patient presented to the emergency department with complaints of fever and pain in the inguinal region. The patient had known hypertension, DM, and obesity. She used insulin for DM and beta-blockers for hypertension. A physical examination revealed tenderness and defense in the right and left lower quadrants of the abdomen. Other system examinations were normal. The patient's temperature was 37°, her pulse was 85/min, her respiratory rate was 17/min, and her Ta was 140/80 mmHg. Laboratory analyses revealed the following: hemoglobin 12.3 g/dl, hematocrit 37.1%, white blood cell 6.79 K/ μ L, CRP (C-reactive protein) 439 mg/dl, platelet 102 K/ μ L, glucose 343 mg/dl, urea 95.9 mg/dl, creatinine 2.11 mg/dl, sodium:130.3 mmol/L, and potassium: 4.31 mmol/L; alanine aminotransferase and aspartate aminotransferase values were within normal limits. In the patient with HbA1c 14, an examination of centrifuged urine at 40x objective magnification with full urinalysis revealed that the number of erythrocytes in each area was 2,120, and the number of leukocytes was 443. A contrast-enhanced abdominal CT was requested due to the presence of defense in the examination and the fact that the patient was obese. Although intraabdominal air or loculated or diffuse free fluid collection was not observed in the abdominal CT, air density was observed in the bladder lumen (figure.1).

Figure.1 Gas image in the bladder on CT



Intravenous fluid and insulin therapy were started. 500 cc to 2000 cc isotonic 0.9% sodium chloride treatment was given per hour. 300 U of insulin was administered subcutaneously. She was admitted to the infectious diseases clinic with a preliminary diagnosis of urinary system infection. Piperacillin tazobactam treatment was started, and the patient responded positively to the treatment with a decrease in infection parameters. Intravenous ceftriaxone 2x1 treatment was started due to sensitive *E. coli* growth in the patient's urine and blood cultures. The patient was discharged with recommendations (The patient was informed to apply in case of fever, abdominal pain, nausea, vomiting, and pain in the inguinal region.) on the 12th day of hospitalization, with improvement in the clinical findings, an absence of fever, and a decrease in urea and creatinine values. It was observed that the patient did not have any active complaints at the outpatient clinic appointment 1 month later for control purposes, and there were no findings suggestive of reinfection in the laboratory examinations.

Discussion

Although emphysematous cystitis can be seen with nonspecific symptoms such as fever and myalgia, there may be hospital admissions with symptoms such as pain in the inguinal region and sepsis. When kidney and perirenal necrosis develops, it causes mortality over 20%. (2,3) *Escherichia coli* (60%) and *Klebsiella pneumoniae* (10-20%) are the most common agents of emphysematous cystitis, while *Enterobacter aerogenes*, *Proteus mirabilis* and *Streptococcus* sp. are among the rare agents. *Pseudomonas aeruginosa*, *Candida albicans*, *Clostridium perfringens*, *Enterococcus faecalis*, *Staphylococcus aureus*, *Clostridium welchii* have been reported as case reports (4,5). Although a case report of EC due to *Streptococcus salivarius* has been reported (6), *E. coli* is the most common agent in urine culture in EC, and *E. coli* was also found in our case, confirming our preliminary diagnosis (1,7).

In a retrospective study comparing EC with acute cystitis, patients with diabetes, chronic renal failure, and neurogenic bladder were found to have a significantly higher rate of EC diseases than acute cystitis diseases. HbA1c was also observed to be significantly higher in EC. The risk of developing sepsis and mortality is also higher in EC than in acute cystitis (2). In this case, our patient had uncontrolled diabetes. There was no history of urinary catheterization or any interventional procedure. Computed tomography was accepted as the most appropriate diagnostic option. Unlike the patients mentioned in previous studies, our patient had significant obesity. We think that obesity may cause difficulties in the regulation of blood glucose, and thus EC occurs. Ultrasonography was not considered appropriate because of our patient's obesity. Although no bladder catheter was applied during tomography scan, the presence of air in the bladder lumen was also a finding in favor of EC.

EC may also develop due to drugs used by a patient. In a patient with grade 4 chronic renal failure, emphysematous pyelonephritis developed after the administration of susipred, a dopaminergic drug, more than the renal dose (8). Although our patient did not use any drug above the renal dose, we learned that the patient was not compliant with her insulin therapy.

In addition, in a previous study by Obeidat et al., EC was diagnosed with the presence of gas in the inferior vena cava, and it was reported that the coincidental gas shadows on the great vessel wall should be examined for possible infection (9). The literature also reports a case of EC that was found incidentally in an immunosuppressed patient with pneumomediastinum (10).

Although EC is rare compared to acute cystitis or other urinary infections, it is a disease that requires early treatment. Antibiotics and supportive therapy are recommended for treatment. Gram staining may affect the treatment process, but ceftriaxone, carbapenem, and aminoglycoside are preferred in the initial treatment of complicated cystitis(5). We know that EC can sometimes accompany pyelonephritis and may progress clinically to the point where a nephrectomy is required (11). The findings for our patient were compatible with EC, and the diagnosis was confirmed by performing a CT examination along with other routine examinations. In our patient, pyelonephritis was not considered by the urology and infectious diseases physicians. No pathology was detected in either kidney with CT, and the patient was discharged with hydration and antibiotic therapy. Although emphysematous cholecystitis is very rare, it should be considered in the differential diagnosis of diabetic patients who are admitted to the hospital and we suspect urinary tract infection, as there is a risk of developing complications.

Conclusion

When evaluating urinary system infections in diabetic patients, EC should be included in the differential diagnosis. With hospitalization and effective treatment, the disease can be treated before it progresses to sepsis.

References

1. Nokay M, Oğul L, Çıra DK et al. Emphysematous Cystitis: A Rare Cause of Abdominal Pain. *Akd Med J*. 2020; 6(2): 314-316.
2. Choi J, Choi S-K, Lee S-H et al. Clinical Outcomes and Risk Factor Analysis of Patients Presenting with Emphysematous Cystitis: A 15-Year Retrospective Multicenter Study. *Medicina*. 2021; 57(6):531. <https://doi.org/10.3390/medicina57060531>.
3. Schicho A, Stroszczyński C, Wiggermann P. Emphysematous cystitis: Mortality, risk factors, and pathogens of a rare disease. *Clin. Pract*. 2017;7:54-5.
4. Thomas AA, Lane BR, Thomas AZ et al. Emphysematous cystitis: a review of 135 cases. *BJU Int*. 2007;100: 17-20.
5. Amano M, Shimizu T. Emphysematous Cystitis: A Review of the Literature. 2014;53(2):79-82. <https://doi.org/10.2169/internalmedicine.53.1121>.
6. Okada S, Ichimura Y, Linuma M. Emphysematous cystitis due to *Streptococcus salivarius* infection in a patient with a neurogenic bladder. *IDCases*. 2022;27: e01410. <https://doi.org/10.1016/j.idcr.2022.e01410>.
7. Grupper M, Kravtsov A, Potasman I. Emphysematous cystitis: Illustrative case report and review of the literature. *Medicine (Baltimore)* 2007; 86(1):47-53. <https://doi.org/10.1097/MD.0b013e3180307c3a>.
8. Noda R, Nishinarita J, Araki K et al. Emphysematous Cystitis Caused by Dysuria due to Sulpiride in a Patient with Chronic Kidney Disease: a Case Report. *SN Compr. Clin. Med*. 2022;4:97. <https://doi.org/s42399-022-01180-7>.
9. Obeidat N, Al-Omari MH, Shwayyat B. Showering gas bubbles within the inferior vena cava detected sonographically can unmask a hidden infection: a case report of a rare presentation in a patient with emphysematous cystitis. *J Ultrasound (2022)*. (Ahead of print). <https://doi.org/10.1007/s40477-022-00673-4>.
10. Tsakalidis G, Bousiou Z, Dimou-Besikli S et al. Pneumomediastinum as a rare complication in an immunosuppressed patient with emphysematous cystitis. *Clin Case Rep*. 2022; 10(2):e05429. <https://doi.org/10.1002/ccr3.5429>.
11. Yıldız H. Coexistence of Rare Emphysematous Pyelonephritis and Cystitis in Uncontrolled Diabetes Mellitus Case: Case Report and Literature Review. *KSÜ Med Fac. Journal*. 2019;14(2): 85-88.