

EMPHYSEMATOUS CYSTITIS: A CASE REPORT

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Abstract

Introduction: Emphysematous cystitis (EC) is an infectious cystitis characterized by gas formation in the urinary tract and usually caused by gas forming *Escherichia coli* or *Klebsiella pneumoniae* strains. The gas accumulates in the bladder wall can be seen by computerized tomography (CT). Therefore, CT is used for accurate diagnosis.

Case Report: A 69-year-old diabetic man had lung adenocarcinoma presented by abdominal pain for a week. He had type 2 diabetes mellitus for two years and he received first chemotherapy cure approximately three weeks before. The patient was oriented, afebrile and normotensive. On physical examination, he has only suprapubic tenderness. Abdomino-pelvic CT was performed, and it showed that bladder wall was diffusely thickened, with the largest measurement of 18 mm. Accumulation of the air within the bladder wall was detected. The result of urine culture revealed more than 20.000 colonies of *Klebsiella pneumoniae*. The patient was diagnosed with emphysematous cystitis then he was hospitalized, and intravenous piperacillin/tazobactam treatment was initiated.

Conclusion: It is very important to make a definite diagnosis in EC. EC should be kept in mind in diabetic patients with abdominal pain.

Keywords: Emphysematous cystitis; Computed tomography; Diabetes mellitus

Introduction

Emphysematous cystitis (EC) is an infectious disease characterized by gas formation in the urinary tract and wall of the bladder. It is usually caused by *Escherichia coli* and *Klebsiella pneumoniae* (1-4). It is usually seen in diabetic patients. However, neurogenic bladder, advanced age and immune-suppression are important risk factors for EC (2, 5, 6). EC frequency of females is two times higher than that of males (3,7). The clinical symptoms of EC range from asymptomatic to severe sepsis (4). It is very important to make a definite diagnosis to prevent serious morbidity in EC (2, 5). As there is no typical clinical sign, diagnosis can be made clinically with fever, abdominal pain, tenderness in the examination, and neutrophil leukocytosis in laboratory tests and imaging techniques (2, 5, 6). The best diagnostic imaging modality is computed tomography (CT) for EC (4). In this report, we present a case who admitted to our emergency department with the complaint of lower abdominal pain for a week and diagnosed with EC by CT.

Case Report

A 69-year-old male patient with known diabetes and lung adenocarcinoma was admitted to the emergency room with a complaint of lower abdominal pain and

fever for a week. The patient's medical history revealed that, he had been followed up for 2 years due to type 2 DM and he had received the first chemotherapy cure approximately three weeks before. The patient was oriented, afebrile and normotensive. On physical examination, he has only suprapubic tenderness. Intravenous hydration was initiated, and urinary catheter was inserted. Laboratory analysis revealed that, blood glucose level was 133.4mg/dL, creatinine was 0.96 mg/dL, white blood cell counts were $5.39 \times 10^3/\mu\text{L}$ with 54% neutrophils, and C-reactive protein was 7.42 mg/dL. Abundant leukocytes and erythrocytes were found in urinalysis and nitrate was negative. More than 20.000 colony forming units/mL of *Klebsiella pneumoniae*, sensitive to gentamicin and piperacillin/tazobactam, were detected in urine culture. The patient has been consulted with Infectious Diseases and Clinical Microbiology Department. Ertapenem was recommended as the initial antibiotic. Abdominopelvic CT showed diffuse thickening of bladder wall and accumulation of air within lumen and wall of the bladder (Figure 1). The patient was diagnosed with EC, then he was hospitalized, and intravenous piperacillin/tazobactam treatment was initiated. After 72 hours the patient was asymptomatic and was transferred to oncology service. The patient treated with intravenous

antibiotics for 14 days and was discharged from the hospital.

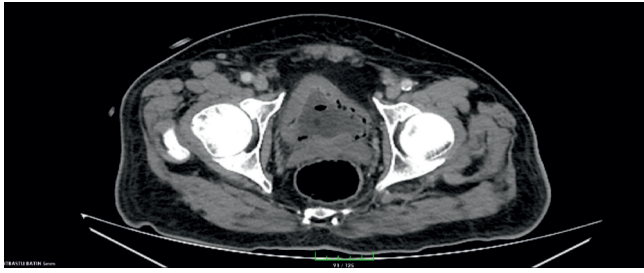


FIGURE 1. Abdominopelvic computed tomography showed accumulation of air within lumen and wall of the bladder

Discussion

EC is a rare condition characterized by bacterial and fungal source gas formation around the bladder wall (4). Gas in the urinary tract was initially described in 1671 (8). Intramural gas in the bladder was first reported at autopsy by Eisenlohr in the late 1800s. In 1961, EC defined as 'cystitis emphysematosa' by Bailey (4).

EC is usually seen in the elderly persons with diabetic females (5). The most common risk factor is diabetes mellitus. Other factors are immunocompromised patients, neurogenic bladder and recurrent urinary tract infections (4). Toyota et al. have reported that 63.4% of patients with EC is woman and 66.7% is diabetic (9). Thomas et al. have reported that 48% of patients with type 1 DM and 52% of patients with type 2 DM (8). It is seen in woman double times more than men (5). Our patient had immune suppressive conditions and DM.

The main pathogenesis of EC is not yet fully explained (10). High glucose concentration within the urinary tract plays main role in the development of EC (11). Fermentation of glucose in diabetic patient and fermentation of lactose or amino acids in non-diabetic patient with EC are the primary factors for gas production (5, 10). Our case was an elderly diabetic man. The clinical presentation of EC is varied and ranging from asymptomatic to severe sepsis (10, 11). Abdominal pain is the most common complaint (3). Similarly, our patient was admitted in our emergency department with lower abdominal pain.

Various bacterial and fungal organisms can cause EC. The most common causative agents of EC are *Escherichia coli* (60%) and *Klebsiella pneumoniae* (10-20%) (11). In our case causative agent of EC was

Klebsiella pneumoniae. Radiological examinations are not important in most urinary tract infections (6). Abdominal X-ray shows a curvilinear area of increased radiolucency delineating the urinary bladder wall with or without intraluminal air. Ultrasound has low sensitivity for diagnosis and it shows bladder wall thickening (3). Thomas et al. have reported that 7% of cases were asymptomatic and were incidentally detected on abdominal imaging (8). The most important imaging method is CT and is being more sensitive than plain abdominal films for the diagnosis of EC (11). Grupper et al. have reported that 94.4% of the cases had air in the bladder wall and 3.7% of the cases had air in the bladder lumen in CT examination (12). Assessment of the extent of disease, such as emphysematous pyelonephritis, is confirmed by CT evaluation. CT is useful in the differential diagnosis of other pathologies that can create gas in the bladder, like vagina, uterus, colo-vesical and vesico vaginal fistula (3, 5). In our case abdominopelvic CT showed bladder wall diffuse thickening and accumulation of air within wall of the bladder.

The treatment generally consists of antibiotics, bladder drainage, glycemic control and treatment of predisposing condition (8, 11). Thomas et al. found that 9% of patients were treated with oral antibiotics, however most patients were treated with an initial intravenous antibiotic. In most cases broad spectrum antibiotics are used initially (8). According to the pathogen isolated in urine culture, antibiotics can be changed to more specific antibiotics (4). In our case *Klebsiella pneumoniae*, sensitive to gentamicin and piperacillin/tazobactam, were detected in urine culture. Mortality rate of EC is 7%. If the upper urinary tract is affected, the mortality and morbidity rates are increasing significantly. Surgical interventions may be performed in cases who do not respond to medical treatment (6).

Conclusions

EC is a disease that cannot be diagnosed easily. Early detection and treatment of EC is important. Physicians should know the risk factors and aware of symptoms like abdominal pain, fever, hematuria, to avoid the potential morbidity and mortality of EC.

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