UNUSUAL GAS PATTERN IN EMPHYSEMATOUS CYSTITIS: A CASE REPORT

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We present a case of emphysematous cystitis in a 43-year-old female. The gas pattern was unusual because there was only gas accumulation in the urinary bladder without bladder wall thickening or intramural gas formation. The differential diagnosis included postoperative states, enterovesical fistula, and iatrogenic instrumentation. The prognosis of emphysematous cystitis is good after early diagnosis and prompt treatment with appropriate antibiotics, blood glucose control, and adequate urinary drainage. The patient was discharged on hospital day 5 with one additional week of oral antibiotic therapy. She was quite well at the time of writing and her diabetes was controlled with an oral hypoglycemic agent.

Key Words: emphysematous cystitis, diabetes mellitus

Emphysematous cystitis is a rare disorder. It is a complication of urinary tract infection in which bacteria produce gas in the bladder wall and lumen. Acute bacterial cystitis in patients with diabetes mellitus [1], various neurogenic bladder diseases, and recurrent urinary tract infection may be associated with the formation of both intraluminal and intramural gas in the urinary bladder [2]. The severity of the illness ranges from asymptomatic conditions to life-threatening cystitis [3]. We present a case of advanced emphysematous cystitis and discuss the concomitant risk factors.

CASE PRESENTATION

A 43-year-old woman presented with a 2-day history of abdominal distension and discomfort and also complained of pain on micturition and urethral tenderness. She had received treatment for diabetes mellitus with an oral hypoglycemic agent for 12 years.

On initial examination, the patient was afebrile with unremarkable vital signs. Her abdomen was obviously distended with hypoactive bowel sounds on auscultation and hypertympanic on percussion. She had mild, diffuse abdominal discomfort on deep palpation, but no evidence of peritoneal irritation. The remainder of her examination was unremarkable.

Laboratory work-up showed an elevated white blood cell count of 13,830/mm³, a hemoglobin concentration of 14.0 g/dL, and a platelet count of 155,000/mm³. Blood chemistry tests showed a blood urea nitrogen of 15 mg/dL, creatinine concentration of 0.95 mg/dL, and fasting blood sugar of up to 710 mg/dL. Urinalysis revealed cloudy urine with 10–25 red blood cells per high-power field (HPF) and more than 100 white blood cells per HPF. Urinalysis revealed cloudy urine with 10–25 red blood cells per high-power field (HPF) and more than 100 white blood cells per HPF. Abdominal plain films showed a markedly distended hollow viscus in the lower abdomen (Figure 1). Abdominal sonography revealed bilateral hydronephrosis and arc-shaped highly echogenic spots with poor identification of the urinary bladder. Computerized tomography (CT) showed intravesical gas formation and air-fluid level (Figure 2).

A Foley catheter was placed immediately and the patient was admitted to the hospital for intravenous antibiotic...
therapy. She was initially prescribed broad-spectrum coverage (gentamicin 80 mg/q12h). Urine culture grew *Escherichia coli* with more than $10^5$ colony-forming units/mm$^3$. At this time, the antibiotic was changed to ciprofloxacin according to the sensitivities of the cultured organisms. The patient did very well, improving rapidly with the new antibiotic. Follow-up urinalysis 5 days after treatment showed 0–2 red blood cells and 0–2 white blood cells per HPF; fasting blood glucose was 150–170 mg/dL. Abdominal plain film showed complete resolution of gas accumulation in the urinary bladder (Figure 3). The patient was discharged on hospital day 5, with one additional week of oral ciprofloxacin therapy.

**DISCUSSION**

Emphysematous cystitis is an uncommonly diagnosed entity of the urinary bladder, characterized by gas-filled vesicles in the urinary bladder wall and, sometimes, gas in the bladder lumen. It is a condition most commonly seen in diabetics and elderly, debilitated, or immunocompromised patients. Other associated conditions are hematologic malignant disease [4], neurogenic bladder, bladder diverticulum [5], and urine retention. Women are more commonly affected than men, with a ratio of 2:1 [6].
The cause of the gas formation in emphysematous cystitis is believed to be bacterial fermentation of either glucose or albumin to carbon dioxide [6]. The most commonly reported organism is E. coli; other pathogens have included Aerobacter aerogenes, Staphylococcus aureus, Klebsiella pneumoniae, Candida albicans and Clostridium perfringens [5,7–9].

Clinical findings of emphysematous cystitis range from various symptoms of lower urinary tract infection such as frequency, dysuria, gross hematuria, and lower abdominal pain to fulminant sepsis [2,6]. Pneumaturia is not always present, but should raise suspicion of emphysematous cystitis as part of the differential diagnosis.

Radiologic diagnosis of emphysematous cystitis is based on detection of gas within the bladder wall [6]. Gas bubbles may outline the bladder, giving a “cobblestone” or “beaded necklace” appearance [7]. However, in our case, the gas accumulation was mostly within the urinary bladder while the bladder wall was free of gas formation. Purely intraluminal gas accumulation is rare in emphysematous cystitis. The patient had acute urine retention and the high level of urine glucose may have caused the purely intraluminal gas accumulation. The differential diagnosis included instrumentation, the presence of fistulous connection between the bladder and bowel, and post-operative states.

Typical sonographic features comprise a thickened bladder wall with foci of intramural increased echogenicity and acoustic shadowing, characteristic of gas bubbles [2]. If any doubt exists, CT should be performed to reveal the location of gas: within the wall, in the lumen, or extravesical gas collection. Typical CT features are pockets of gas in and around the bladder wall [6]. The CT scan in our case revealed an irregular bladder wall without intramural gas formation and purely intraluminal gas accumulation.

Treatment of emphysematous cystitis involves early broad-spectrum antibiotics, drainage of the bladder, and management of any hyperglycemia [1,10,11]. Empiric antibiotics should cover aerobic as well as anaerobic organisms. Urinary drainage with a urethral catheter should be sufficient [12]. Rarely, surgical debridement and drainage is needed if an abscess develops outside the bladder. Treatment of hyperglycemia will decrease glycosuria and, therefore, decrease the bacterial substrate for gas formation. Prognosis in patients diagnosed and treated early in the disease process is usually good. The development of emphysematous ureteritis, nephritis, or adrenalitis portends a poor prognosis [6].

Emphysematous cystitis is a relatively uncommon disease, yet it is one for which a high index of suspicion can lead to early diagnosis, treatment, and improved outcome. Treatment with appropriate intravenous antibiotics, relief of obstruction and urinary drainage, and control of underlying processes such as hyperglycemia are paramount to successful intervention.

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氣腫性膀胱炎不尋常的產氣表現 — 病例報告

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我們報告一位 43 歲女性罹患氣腫性膀胱炎的病例，其產氣的不尋常表現在於氣體
只堆積在膀胱內，而膀胱壁並無增厚或膀胱壁內氣體累積的現象，和典型氣腫性膀胱
炎不同。需要鑑別診斷的疾病包括：手術後氣體累積，腸道與膀胱廔管，以及醫療器
械檢查所造成。如果早期診斷與治療，包括適當的投與抗生素，控制血糖，以及足夠
的尿液引流，氣腫性膀胱炎的預後是不錯的。這位患者在住院五天後出院，並給予一
個星期的口服抗生素治療，目前病況相當不錯並接受口服降血糖藥物治療糖尿病。

關鍵詞：氣腫性膀胱炎，糖尿病
（高雄醫誌 2005;21:44 – 7）