

# CASE REPORT

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## EMPHYSEMATOUS CYSTITIS: CASE REPORT AND REVIEW OF LITERATURE

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**ABSTRACT:** Background: Emphysematous cystitis is defined by the presence of gas in the urinary bladder wall in the absence of previous instrumentation or surgery or diverticular diseases of colon or malignancies. It complicates urinary tract infections especially in diabetic patients. **AIMS:** We report a case of 65yr old, poorly controlled, diabetic male who presented with dysuria, fever and hematuria and was incidentally found to have Klebsiella pneumoniae emphysematous cystitis that resolved with antibiotic treatment and bladder drainage. **METHODS AND RESULTS:** A 65-year-old man was admitted to the emergency department with retention of urine. There was history of fever since 2 days. There was no history of previous retention of urine. An ultrasound examination of abdomen and pelvis showed gas in the bladder which was confirmed by computed tomography (CT), which demonstrated intramural gas in the urinary bladder, which suggested a diagnosis of emphysematous cystitis. The treatment was based on an antibiotics associated with a bladder drainage. **CONCLUSION:** Every diabetic patient with a urinary tract infection who seems to be severely ill should have an abdominal X-ray or CT scan as a minimal screening tool to detect emphysematous complications.

**KEY WORDS:** emphysematous, cystitis, urinary tract infection.

**INTRODUCTION:** Emphysematous cystitis, described for the first time by Keyes in 18821, is an uncommon but severe infection of the bladder characterized by gas within the wall and the lumen of the bladder. The condition is seen most commonly in patients with hyperglycemia, the organism recovered from the urine usually being Escherichia coli or Enterobacter aerogenes. There should not be any history of previous urinary tract surgeries or instrumentation or and colorectal malignancies or diverticular diseases. The diagnosis of emphysematous cystitis is more often radiographic. CT is a highly sensitive imaging modality used in the detection of intraluminal or intramural gas<sup>2</sup> which forms the radiologic basis of the diagnosis. Early management is essential and includes bladder drainage, intravenous antibiotics and Diabetes stabilization.

**CASE REPORT:** A 65 year old diabetic male patient who has been on oral antidiabetic medications irregularly for 12 years presented with retention of urine to the emergency department. There was no previous history of retention of urine. He had lower urinary tract symptoms in form of urgency and frequency for the past 15days. On examination, the patient was conscious, oriented, the temperature was 39.0C° with a pulse of 96beats per minute. He had a distended bladder. Cardiac, pulmonary and neurological examinations were unremarkable. Digital rectal examination revealed a non tender enlarged prostate. The laboratory test showed a haemoglobin of 11g/dl, leucocytosis (13,500cells/cumm), random blood sugar 308mg/dl, creatinine of 2.0mg/dl with normal renal and liver functions and serum electrolytes. His glycemic control had remained poor previously. Abdominal ultrasonography revealed a distended urinary bladder with about one litre of urine with

# CASE REPORT

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gas. X-ray of pelvis showed gas in urinary bladder wall (Fig. 1). A CT scan delineated a distended bladder with circumferential intramural air and intravesical air-fluid level (Fig.2).

A Foleys catheter was inserted and the urine obtained was turbid and haematic. We also noted pneumaturia, and the urine was sent for culture & sensitivity. The patient was empirically started on Ceftriaxone and metronidazole along with insulin. The urine C/S revealed growth of a highly resistant *Klebsiella pneumoniae* sensitive to only gentamicin/amikacin. Since his renal functions were altered we didn't start him on any of those drugs. His diabetes was stabilized and the condition improved. The Foleys catheter was removed after 21 days and patient voided without any hesitancy and post void urine was insignificant.

**DISCUSSION:** Emphysematous cystitis is a rare entity characterized by pockets of gas in and around the bladder wall produced by bacterial or fungal fermentation<sup>3, 4</sup>, mostly in the patients in their late fifties. It is twice as frequent in women as in men<sup>4</sup>. Patients may complain of irritative symptoms, abdominal discomfort or pneumaturia. A history of pneumaturia is highly suggestive, but is rarely offered by the patient. As occurred in our case and in a number of cases in the literature, the clinical features were inconclusive or actually unhelpful<sup>5-8</sup>.

The radiographic findings provide the first and only diagnostic clue. Ultrasound appearance is of echogenic air within the bladder wall with dirty shadowing artifact. Bladder wall will be diffusely thickened with increased echogenicity. In plain X-Ray Erect view curvilinear shadow in bladder area will be separate from more posterior rectal gas (cobble stone or beaded necklace appearance). Lateral decubitus view occasionally required. Intraluminal gas will be seen as air fluid level that changes with patient position<sup>4</sup>.

It occurs mainly in the elderly with poorly controlled diabetes. Other predisposing factors include the presence of a post-micturition residue or chronic retention (neurogenic bladder, diabetic, prostatic or urethral obstacle), presence of renal transplantation, renal infarction, systemic lupus, immunodepression due to long-term corticotherapy or immunosuppressors such as cyclophosphamide well-known for their vesical toxicity<sup>9-12</sup>, the occurrence of postoperative emphysematous cystitis following endoscopic urologic procedures or colic surgery have been reported in the literature<sup>13</sup>. Therefore, in susceptible patients, with the above risk factors along with signs and symptoms of urinary tract infection, the index of suspicion for this entity should be high. The most common organism is *E. coli*<sup>5</sup>, but other organisms reported to produce emphysematous cystitis include *Enterobacter aerogenes*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Staphylococcus aureus*, streptococci and *Clostridium perfringens*<sup>14</sup>. Cases with emphysematous cystitis due to *Candida albicans* have also been reported<sup>15</sup>. The mechanism by which gas appears in the wall of the bladder may involve either transluminal dissection of gas or true infection of the bladder wall with pathogens.

Diagnostic entities associated with gas in the genitourinary tract include emphysematous pyelonephritis, emphysematous pyelitis, and gas-forming renal abscess. Patients with emphysematous cystitis are not as acutely ill as those with pyelonephritis or pyelitis. Abdomino-pelvic CT scan can further delineate the extent of disease. CT scan also helps to evaluate bladder lumen, bladder wall, peritoneal cavity, retroperitoneal space, pleural effusions and presence of ascites fluid.

# CASE REPORT

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It is important to differentiate emphysematous cystitis from emphysematous pyelonephritis, in which gas involves the renal parenchyma, since the latter has an increased mortality and generally requires nephrectomy. In contrast surgical intervention is rarely needed in emphysematous cystitis except when an anatomical abnormality like an obstruction or stone is present<sup>16</sup>. Cystoscopy may be required to evaluate bladder outlet obstruction if the patient is not voiding. Findings include thin walled sub mucosal vesicles with purulent fluid, debris and clots. Even with complete bladder mucosal sloughing bladder can regenerate completely. Gentle maneuvering of cystoscope is important to avoid perforation of thin walled bladder.

The source of this gas within the urinary tract is from infection, trauma, vesico-enteric fistulas from radiation therapy, rectal carcinoma, diverticular disease or Crohn's disease and iatrogenic causes, such as diagnostic or surgical instrumentation. Carbon dioxide (CO<sub>2</sub>) is the gas found in the vesical wall. It results from the bacterial lucid fermentation and testifies to bacterial breathing in anaerobiosis. CO<sub>2</sub> producing germs attack not only the glucose that is present in the urine of the diabetics, which causes air to appear in the bladder cavity, but also the glucose contained in the bladder parietal cells, which causes CO<sub>2</sub> bubbles to appear inside the very vesical wall.

History, physical exam and imaging are the best modalities to differentiate the above etiologic causes. Fistulous tracts abscess, can be excluded on CT scan.

Emphysematous cystitis requires aggressive treatment with parenteral antibiotics and bladder drainage<sup>17</sup>. Delayed diagnosis may lead to unfavorable outcomes including overwhelming infection, extension to ureters and renal parenchyma, bladder rupture<sup>18</sup> and death. Improved outcomes may be achieved by early recognition of the infection, by clinical and radiological assessment, and by appropriate antibiotic therapy.

Follow up CT scan is required when there is clinical deterioration which can reveal necrosis of the bladder wall and peritonitis which requires surgical intervention like partial cystectomy, total cystectomy or surgical debridement. Overall death rate is 7% which increases to 50% when perivesicular gas migrates into upper tract. Nutritional status, bed sores, ambulation should also be addressed when the patient is bedridden due to overwhelming infection.

**CONCLUSION:** Emphysematous cystitis most often is not diagnosed by routine or systematic approach. It is a rare entity, detected on imaging, and the physician should be cautious, tailor the diagnostic approach to individual patients based on the suspicion, available clinical and radiological data, and consider emphysematous cystitis in the differential diagnosis of hematuria in a patient with known risk factors.

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## CASE REPORT

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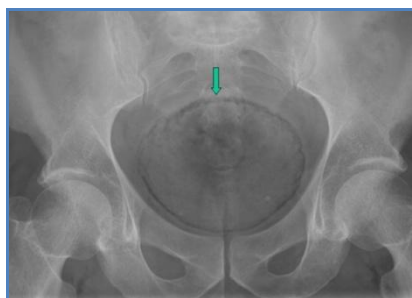


Figure: 1: X-ray of pelvis showing gas in the urinary bladder wall (Arrow)



Figure: 2: CT scan of the pelvis revealing gas in the bladder and the bladder wall

# CASE REPORT

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