

Emphysematous Cystitis : 3 Cases Report¹

Ho Jong Chun, M.D., Jae Young Byun, M.D., Jae Moon Lee, M.D.,
Hee Jung Ro, M.D., Kyung Sub Shinn, M.D.

Emphysematous cystitis is a rare condition characterized by gas collection in the wall and lumen of the bladder. We experienced three cases of emphysematous cystitis. All patients were female; one was associated with a long term history of diabetes mellitus and another with urinary indwelling catheter. All of the cases were easily diagnosed on plain radiograph and CT scan, and were successfully treated with antibiotic therapy. In one of the cases, however, associated abscess due to perivesical extension of inflammation was treated by combined external drainage.

Index Words : Bladder, radiography
Bladder, CT
Cystitis

Emphysematous cystitis is a rare variant of acute cystitis, which is characterized by gas collection within the bladder wall and lumen, mainly caused by gas-forming bacteria (1). Most patients experience non-specific symptoms of cystitis such as frequent urination or dysuria, and lower abdominal discomfort. Rarely, pneumaturia, "wind pass through urethra" may be present, which is specific to emphysematous infection of urinary tract. Early diagnosis and treatment with adequate antibiotics may lead to favorable prognosis, and underlying disease such as diabetes mellitus should also be treated.

We report three cases of emphysematous cystitis, with review focused on etiologic agent, pathogenesis, and advantage of CT scan in detecting extravesical extent.

CASE REPORTS

Case 1

A 79-year-old woman admitted to the hospital for intracerebral hemorrhage caused by hypertension. Urinary indwelling catheter was inserted for absolute bed rest. On eighth conservative treatment day, bacteriuria and pyuria were detected on routine urine examin-

ation, although she did not complain any discomfort. The plain film demonstrated circumferential radiolucent line outlining the bladder (Fig. 1a). Pelvic CT scan obtained six days after the plain radiograph also revealed multiple gas collections within the bladder lumen (Fig. 1b). The urine culture yielded more than 10⁵ E. coli per milliliter. On 20th hospital day, she was discharged with favorable condition after antibiotic therapy, and the last urinalysis revealed normal urine contents without any bacteria or pus cells.

Case 2

A 23-year-old woman admitted to the psychiatric department for somatoform pain disorder. On 20th hospital day, barium enema was done for evaluation of mild fever, low back pain and elevated serum level of CEA. There was an air-fluid level at the anterior aspect of the rectum, representing air in distended bladder (Fig. 2a). Pelvic CT scan obtained eight days after the barium enema also showed multiple gas collections in the lumen of the bladder (Fig. 2b). She was treated with antibiotics because of bacteriuria and pyuria in urinalysis, and discharged on 61th hospital day without any abnormality in urine examination.

Case 3

A 55-year-old woman had suffered from lower abdominal pain with urinary frequency. She had a history of diabetes mellitus for 10 years. On admission, the urinalysis revealed pyuria and hematuria. Urinary indwelling catheter was inserted due to voiding difficulty,

¹Department of Radiology, Catholic University Medical College
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Address reprint requests to: Jae Young Byun, M.D., Department of Radiology,
Catholic University Medical College, Kangnam St. Mary's Hospital. # 505,
Banpo-dong, Seocho-Ku, Seoul, 137-040 Korea.

Tel. 82-2-590-1576 Fax. 82-2-599-6771

and pus was drained through catheter. Urine culture yielded growth of 104~105 yeast-like organisms per milliliter (*Candida* species). On 4th hospital day, pelvic ultrasonography (US) showed diffuse irregular wall thickening of bladder and inhomogenous internal echogenicities. A low echogenic mass was noted in the pelvic cavity adjacent to the bladder (Fig. 3a). On eighth hospital day, pelvic CT scan demonstrated a perivesical fluid collection with thickened enhancing wall. There showed several gas collections in the wall of the bladder (Fig. 3b). Perivesical abscess drainage with US guidance was performed on 13th hospital day, followed by massive antibiotic therapy, bladder irrigation, and treatment of diabetes mellitus. On 20th hospital day, follow-up pelvic US was done, representing disappearance of perivesical abscess pocket, which was indicative of successful external drainage. She

was discharged on 62th hospital day in good condition following further treatment for diabetes mellitus and neurogenic bladder.

DISCUSSION

Emphysematous cystitis may have a variety of etiologic agents and associated primary conditions. This condition is mainly caused by gas-forming bacteria, such as *E. coli* or *Enterobacter aerogenes* and less frequently, by *Proteus mirabilis*, *Staphylococcus aureus*, *Clostridium perfringens*, *Nocardia*, and *Candida albicans* (2, 3). *E. coli* and *Candida* species were confirmed in two of our three cases, but, in case 2, sterile urine culture was obtained although bacteria was present in urine specimen. Anaerobic culture was not done routinely, so there may be possibility that an

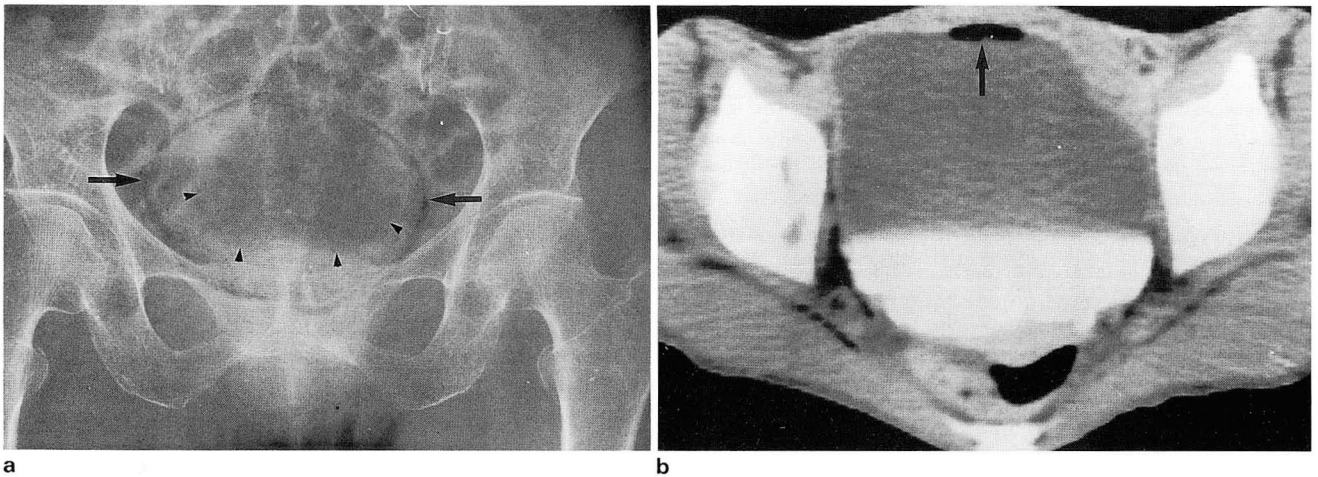


Fig. 1. a. KUB shows circumferential radiolucent line (arrows) outlining the urinary bladder wall and ill-defined lucency in the bladder wall (arrow heads).

b. Pelvic CT scan obtained 6 days after the KUB shows gas collection (arrow) within the lumen of the urinary bladder anteriorly.

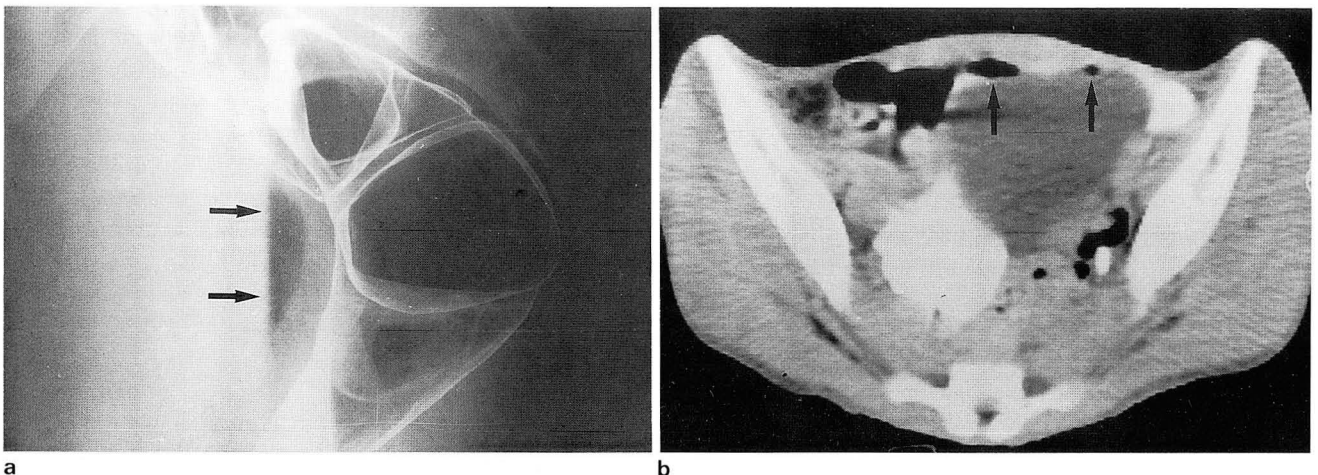


Fig. 2. a. The horizontal lateral view of barium enema reveals air-fluid level (arrows) at the anterior aspect of the rectum, representing gas collection within the distended bladder.

b. Pelvic CT scan obtained 8 days after the barium enema shows multiple gas collections (arrows) within the bladder lumen.

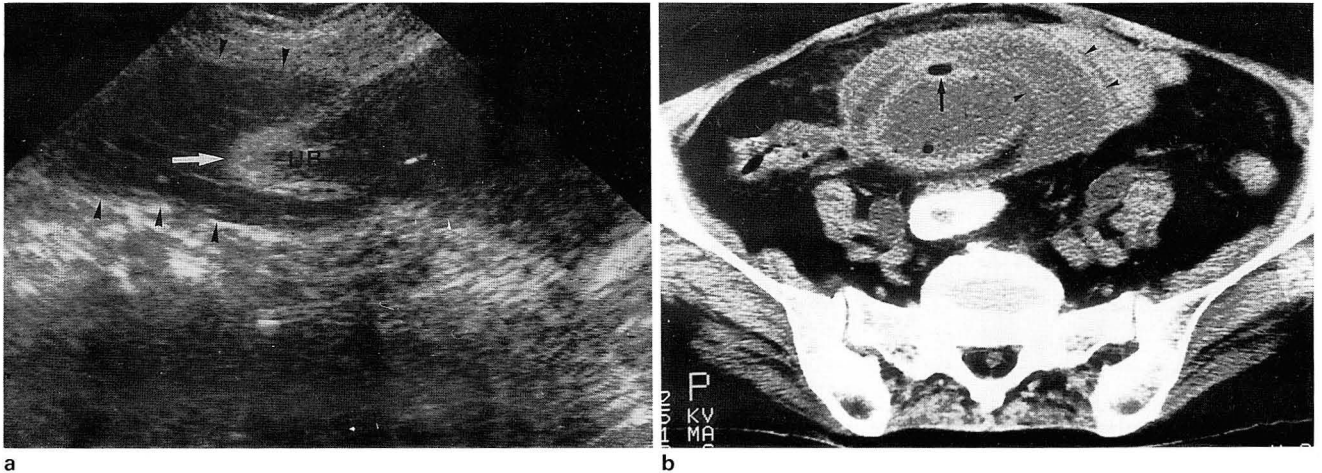


Fig. 3. a. Pelvic US reveals diffuse wall thickening (arrow) of the urinary bladder (UB) and perivesical fluid collection (arrowheads).
b. Pelvic CT scan demonstrates diffuse wall thickening of the bladder with gas collection (arrow) within the wall. Perivesical abscess with well-enhancing wall (arrowheads) is also noted.

anaerobic pathogen such as *Clostridium perfringens* may be involved.

The pathogenesis of this disease has been thought that bacterial fermentation of glucose creates CO₂ gas bubbles, which are collected within the submucosa and lumen; therefore, diabetes mellitus is associated more than half of all cases (4). Less commonly, there may be an association with debilitated or elderly patients, or with urinary outflow tract obstruction, structural abnormalities of bladder, and indwelling urinary catheter. It is more frequently seen in female patients. In case 3, the patient had a 10-year history of diabetes mellitus. Case 1 may be more susceptible to urinary tract infection, since urinary indwelling catheter was inserted for a considerable time.

The radiologic findings are usually quite characteristic and may offer definitive diagnostic information. There is a concentric or semilunar radiolucent line around bladder wall and gas collection showing a cobblestone or beaded necklace appearance within the lumen often in plain film. US findings are diffuse wall thickening of bladder with multiple irregular echogenic foci associated with posterior shadowing (5). In CT

scan, gas bubbles within the bladder wall or lumen may be demonstrated early for prompt diagnosis and treatment and the extent and location of extravescical gas collection can be assessed (6). Characteristic radiologic findings were demonstrable in all cases which were successfully treated with antibiotics except in one case with percutaneous catheter drainage performed additionally.

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기종성 방광염: 3예 보고¹

¹가톨릭대학교 의과대학 방사선과학교실

천호중 · 변재영 · 이재문 · 노희정 · 신경섭

기종성 방광염은 방광 내강과 벽에 가스가 형성되는 것을 특징으로 하는 희귀한 질병으로, 저자들은 최근 기종성 방광염 3예를 경험하여 이를 보고하려 한다.

세 환자는 모두 여자였는데, 이중 1명은 10년간의 당뇨병의 병력을 가지고 있었고, 다른 1명은 상당기간 유치 카테터를 삽입하고 있었다. 3예 모두 단순촬영과 CT 촬영으로 진단이 가능하였고, 항생제 요법으로 용이하게 치료되었다. 그러나 1예에서는 방광주위에 염종 파급으로 인한 농양이 동반되어, 경피적 배액술을 추가로 실시하였다.

1996년도 울산의대 진단방사선과학교실 연수교육

1996년도 울산의대 진단방사선과학교실 연수교육 일정을 다음과 같이 알려 드립니다.

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