

## CASE REPORT

# Emphysematous Prostatitis Caused by *Klebsiella pneumoniae*

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Emphysematous prostatitis is a rare condition that is characterized by gas and abscess accumulation in the prostate. We report a 60-year-old man with emphysematous prostatitis caused by *Klebsiella pneumoniae*. He had a history of recently diagnosed diabetes mellitus and a 16-year history of alcoholic liver cirrhosis. He was admitted due to fever, dysuria and difficult urination. Physical examination revealed lower abdominal tenderness and prostatic fluctuance on digital examination. Leukocytosis, pyuria and elevated C-reactive protein were found. Abdominal radiography disclosed a collection of abnormal air pockets in the lower pelvic cavity and computed tomography scans corroborated the existence of extensive air collection in the prostate. Under the impression of emphysematous prostatitis, the patient was successfully treated with transurethral incision of the prostate and antibiotics for 6 weeks; there were no urinary sequelae during 6 months of follow-up. [J Formos Med Assoc 2007;106(1):74–77]

**Key Words:** computed tomography, *Klebsiella pneumoniae*, prostate, prostatitis, radiography

Emphysematous prostatitis is a rare condition that is characterized by gas and abscess accumulation in the prostate, first described by Mariani et al in 1983,<sup>1</sup> several cases have been subsequently reported.<sup>1–5</sup> We report a rare case of emphysematous prostatic abscess due to *Klebsiella pneumoniae* with characteristic plain abdominal radiography and computed tomography (CT) features. The patient recovered completely after transurethral incision of the prostate and 6 weeks of antimicrobial treatment.

## Case Report

This 60-year-old man had a 2-month history of diabetes mellitus without regular medical control and a history of chronic alcoholic, Child C liver cirrhosis. He had been experiencing dysuria and

difficult urination for 10 days. He was brought to our emergency department (ED) because of chills and fever of 1 day's duration. There were associated symptoms of poor appetite, lower abdominal cramping pain, yellowish skin and sclera. In the ED, his vital signs were blood pressure 117/65 mmHg, pulse rate 96/min, and body temperature 38.9°C. Initial physical examination revealed lower abdominal tenderness without rebounding pain. The prostate was exquisitely tender to palpation with fluctuance on digital rectal examination.

Laboratory analysis revealed leukocytosis (white cell count, 11.53 K/ $\mu$ L) with left shift, normal hemoglobin level (13.8 g/dL), low serum platelet count (34,000/ $\mu$ L), mildly prolonged prothrombin time (16.1 seconds; international normalized ratio, 1.4), normal activated partial prothromboplastin time (34.1 seconds), elevated C-reactive protein level of 8.66 mg/dL, normal

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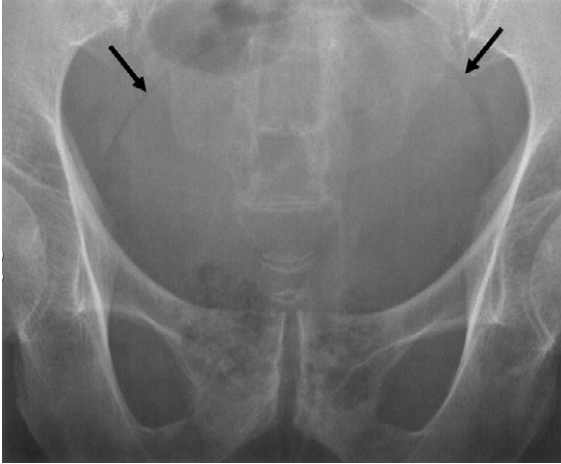
**Received:** October 18, 2005

**Revised:** December 28, 2005

**Accepted:** February 7, 2006

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**Figure 1.** Abdominal radiography shows accumulated air pockets with a globular shape in the lower pelvic cavity, superimposed on the pubic bones. The perivesical fat planes (arrows) are intact.

renal function tests for blood urea nitrogen (16.4 mg/dL) and serum creatinine (0.8 mg/dL), mild hyponatremia (serum sodium, 133 mmol/dL), hypoalbuminemia (serum albumin, 2.7 g/dL), mildly elevated liver function tests (aspartate aminotransferase, 54 U/L; alanine aminotransferase, 21 U/L) and hyperbilirubinemia (serum bilirubin, 9.47 mg/dL). Hyperglycemia was found with initial random one-touch blood glucose 414 mg/dL and subsequent elevated HbA1C 10.3%. Urine analysis revealed some white blood cells and red blood cells seen on high power field examination of urinary sediment. Otherwise, prostate-specific antigen level was not elevated.

Abdominal radiography (Figure 1) showed a collection of air pockets in the lower pelvic cavity in the area of the prostate. The perivesical fat planes were clear. Pelvic CT showed diffuse enlargement of the prostate (3.2 × 3 × 2.5 cm) and extensive air collection in the prostate forming a cavity, highly suggestive of emphysematous prostatitis. Mild enhancement of the rim of the cavity and blurred fat planes in the periprostatic and perirectal areas were suggestive of inflammatory reaction. A small amount of ascites was noted but no lymph node enlargement was found at bilateral common iliac chains and inguinal regions (Figure 2). Transrectal ultrasonography revealed an enlarged prostate with diffuse hyperechoic

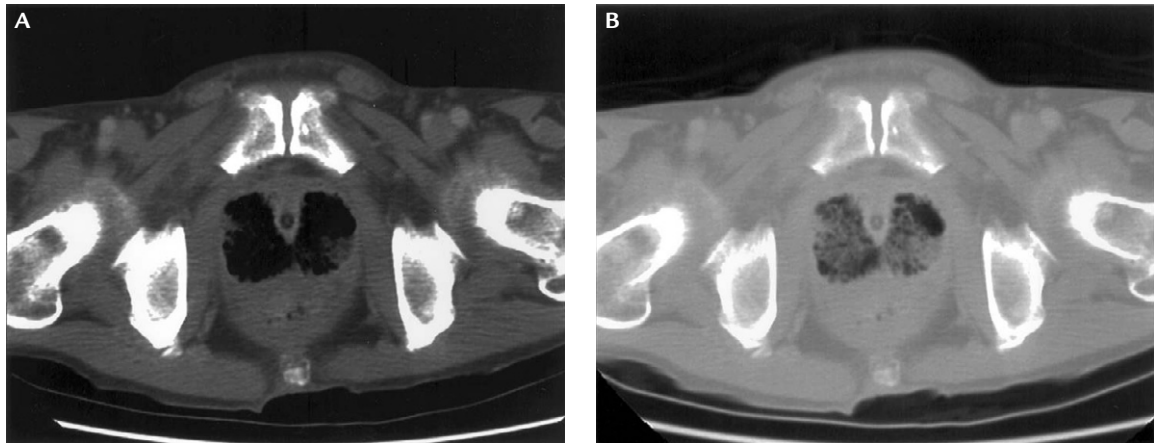
change and urine retention in the bladder. Two days later, blood culture yielded the microorganism *K. pneumoniae*, which was only resistant to ampicillin on routine sensitivity test. Urine culture failed to grow any organisms.

He was treated with parenteral ciprofloxacin 400 mg bid. Insulin was given for glycemic control. A consultant urologist suggested transurethral incision of the prostate (TUI-P) because of its minimal invasiveness and because transurethral resection of the prostate was not favored due to consideration of the patient's impaired coagulation function. On hospitalization day 9, TUI-P was performed due to the patient's continued poor response to medical treatment. During the procedure, copious pus flowed from the incisional wound of the prostate. After combined treatment of antibiotics and TUI-P, there was no pyuria on follow-up urinary analysis. Follow-up abdominal radiography showed the resolution of the abnormal air collection in the pelvic cavity.

After the completion of antibiotics treatment (intravenous ciprofloxacin 800 mg/day for 2 weeks and oral ciprofloxacin 500 mg/day for 4 weeks), he was free from any urinary difficulty or infectious symptoms, and liver function had gradually stabilized 3 months later. However, blood glucose was still poorly controlled due to his reluctance to perform insulin injection.

## Discussion

Prostatic abscess is an infrequent condition that can be diagnosed at an early stage with advanced diagnostic modalities such as ultrasound, CT, or magnetic resonance imaging (MRI). The majority of patients present in the fifth or sixth decade of life and have predisposing factors which may include diabetes mellitus, hepatic cirrhosis, intravesical obstruction, prior genitourinary tract instrumentation or bladder catheterization.<sup>6,7</sup> There are no pathognomonic symptoms or signs. The major presentation is lower urinary tract infection with symptoms of dysuria, frequency, and urgency.<sup>6</sup> Common complaints following initial



**Figure 2.** Abdominal computed tomography in abdominal and lung windows show air collections in the prostate, characteristic of emphysematous prostatitis.

presentation include fever, acute urine retention, and perineal pain. Rectal examination typically reveals increased prostate size and prostatic fluctuance. Because the presenting symptoms of emphysematous prostatitis are nonspecific, patients are often treated for simple urinary tract infection. Proper diagnosis, however, should be based on clinical history, rectal examination, and imaging modalities.<sup>8</sup> Since the diagnosis is often difficult to confirm by history and physical examination alone, prostatic images (transrectal ultrasound, CT or MRI) can be important in the diagnosis and management. Of these types of prostatic imaging, transrectal ultrasound is the most widely used technique in the diagnosis of prostatic abscess and in the guidance of aspiration and drainage.<sup>9</sup> Regardless of the cost-effectiveness, CT or MRI is superior for demonstrating extraprostatic penetration, the extent of the pelvic inflammatory process and other possible infectious sources.<sup>10</sup> Intravenous urography is nonspecific in observing an elevated bladder base, irregularities in one or both prostatic lobes, and mild to moderate urethral dilatation as these findings can also occur with almost any prostatic pathology. Cystoscopy is not useful in diagnosis because it can only demonstrate elongation of the prostatic urethra and trigonal inflammation.<sup>11</sup>

The bacterial flora and etiology of prostatic abscess have changed from Gram-positive infections associated with complications of ineffectively

treated gonorrhea to Gram-negative infections associated with urinary obstruction.<sup>1</sup> Two patterns of etiology have been merged, including primary lower genitourinary tract disease and metastatic abscess. The former is typically caused by Gram-negative pathogens, presumably ascending to the prostatic ducts and the latter is caused by Gram-positive species.<sup>12</sup> Sending material for culture (pus, urine, blood, and/or a fragment of the prostate) is important in order to identify the etiologic agent, especially for immunosuppressed patients because they usually present with uncommon germs.<sup>13</sup> Urine culture may be negative unless the abscess opens into the urethra or bladder. The reported etiologic microorganisms in gas-forming infections of the genitourinary tract include *Escherichia coli*, *Klebsiella* species, *Proteus mirabilis*, *Citrobacter* species, *Pseudomonas aeruginosa*, *Bacteroides fragilis* and yeast.<sup>1-5</sup> Liu et al<sup>7</sup> reviewed 17 cases of prostatic abscess in an endemic area (south Taiwan) and found that all of the causative pathogens were Gram-negative, with *K. pneumoniae* dominant in 10 cases, followed by *E. coli* in two cases and *P. aeruginosa* in one. Gas in body tissues is usually associated with the presence of anaerobic infection. However, Gram-negative facultative anaerobes can also produce gas by fermenting glucose in necrotic tissues. Gas analysis has identified carbon dioxide as the major component. Because carbon dioxide is readily absorbed in human tissue, eventual

resolution occurs after elimination of the infecting microorganism by appropriate therapy.<sup>4</sup>

Most of the available data on prostatic abscess are from case reports, and the diagnostic and therapeutic routine has not been standardized. Review of individual cases allows some general observations regarding treatment of abscesses, which generally consists of parenteral antimicrobial therapy and abscess drainage.<sup>14</sup> Although surgical drainage is the most important step in the treatment of prostatic abscess, the best method of drainage remains somewhat controversial.<sup>9</sup> Drainage can be achieved by a number of routes, including transperineal needle aspiration, transrectal needle aspiration, open perineal incision and drainage, transurethral unroofing, or formal transurethral resection of the prostate. Because a perineal approach could cause impotence due to nerve incision, perineal incision and drainage is now seldom used. Transurethral resection has the potential to cause hematogenous spread of infectious organisms and complications of retrograde ejaculation, urethral stenosis, or urinary incontinence. It is infrequently used in the treatment of prostatic abscess in many institutions. Some studies found that the use of transrectal ultrasound in diagnosis and minimally invasive therapeutic management allowed complete success to be achieved with shortened hospital stay.<sup>9,10,13</sup> In our patient, success was achieved by TUI-P without obvious sequelae or relapse during 6 months of follow-up.

Emphysematous prostatitis is an uncommon but relatively serious disease with high morbidity and mortality. Delay in diagnosis can cause serious sequelae, including rupture of the abscess into the ischiorectal fossa or into the perivesicle space, which are associated with morbidity and death. Suspicion of emphysematous prostatitis in patients with associated risk factors is important

for early and adequate drainage or surgical intervention. CT can aid in an immediate diagnosis. For treatment, appropriate antibiotics and adequate drainage or incision should be combined.

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