

Emphysematous Pyelonephritis Presenting as Necrotizing Fasciitis of the Leg

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We report a 50-year-old man with poorly controlled diabetes mellitus who presented with a painful, swollen right leg. He had also experienced right flank pain for 1 week prior to admission. Physical examination was notable for tenderness over the right flank. The right leg was diffusely swollen and exquisitely tender to touch, with palpable crepitation. Laboratory tests revealed leukocytosis and pyuria. Computed tomography showed a right ureteral stone with hydronephrosis and characteristic findings of emphysematous pyelonephritis. Furthermore, a right perirenal gas-forming abscess with extension to the right leg was noted. The patient was successfully treated with antibiotic therapy, aggressive control of blood sugar, percutaneous drainage of the hydronephrosis and perirenal abscess, and aggressive debridement of the leg. [*J Chin Med Assoc* 2009;72(3):160–162]

Key Words: emphysematous pyelonephritis, necrotizing fasciitis

Introduction

Emphysematous pyelonephritis is an uncommon and life-threatening infection of the kidney. The disease usually occurs in patients with diabetes mellitus, with or without obstructive uropathy, and is characterized by gas accumulation in the renal parenchyma, collecting system, or perirenal tissue. Clinical symptoms and signs are often similar to those of uncomplicated pyelonephritis. Delay in diagnosis is usually due to nonspecific manifestations, such as fever, flank pain, nausea, and vomiting, and results in high mortality rates. We report an unusual case of emphysematous pyelonephritis presenting as necrotizing fasciitis of the ipsilateral leg. Based on thorough history-taking and detailed physical examination, accompanied by essential imaging studies, we were able to establish an early diagnosis and plan appropriate management, which resulted in a good outcome.

Case Report

A 50-year-old man with diabetes mellitus presented to the emergency department with a painful, swollen

right leg. The pain and swelling began 3 days before presentation, worsening until he was unable to walk. Furthermore, he had experienced right flank pain for 1 week before the beginning of the right leg pain. On physical examination, his body temperature was 38.5°C and he had tenderness over the right flank. The right leg was diffusely swollen and exquisitely tender to touch, with palpable crepitation.

Complete blood count on admission showed a white blood cell count of 19,200/ μ L, hemoglobin of 12.4 g/dL, and platelet count of 250,000/ μ L. Blood chemistries showed urea nitrogen 19.1 mg/dL, creatinine 1.1 mg/dL, glucose 418 mg/dL, and HbA1c 15.3%. Urinalysis was remarkable for 3+ occult blood, with numerous white blood cells per high-power field in the urinary sediments.

Computed tomography showed a right ureteral stone with hydronephrosis and gas bubbles in the renal parenchyma and collecting system (Figure 1). A gas-forming abscess below the right kidney was also noted. The presence of gas in the right lateral abdominal wall suggested necrotizing fasciitis and an extension of the inflammatory process from the retroperitoneal abscess. Moreover, the necrotizing fasciitis further extended to the right leg (Figure 2).



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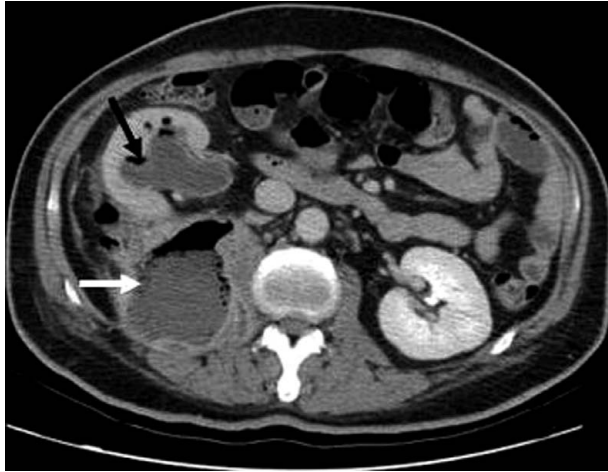


Figure 1. Computed tomography shows right hydronephrosis, gas bubbles in the renal parenchyma and collecting system (black arrow), and perirenal gas-forming abscess (white arrow).

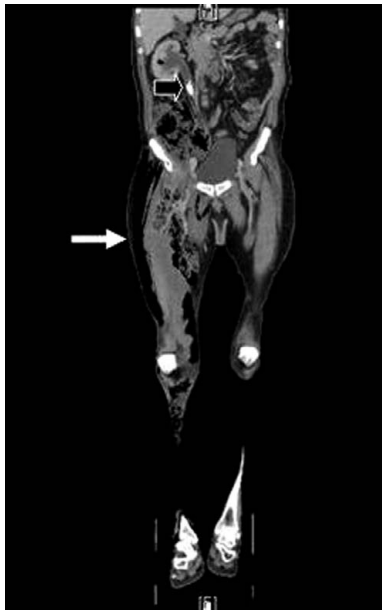


Figure 2. Computed tomography, coronal view, clearly demonstrates a right ureteral stone with hydronephrosis (black arrow) and a gas-forming abscess below the right kidney, with extension to the right leg (white arrow).

The patient was treated with antibiotic therapy, aggressive control of blood sugar, percutaneous drainage of the right hydronephrosis and perirenal abscess, and aggressive debridement of the right leg. Urine culture grew *Escherichia coli*. Culture of the perirenal abscess grew *Escherichia coli* and *Klebsiella oxytoca*. The result of the blood culture was negative.

Over the next 2 weeks, the patient underwent debridement of the affected right leg twice, and percutaneous nephrolithotomy was performed 1 month

after admission. The patient was discharged with the right leg fully recovered.

Discussion

Emphysematous pyelonephritis is a gas-producing, necrotizing infection involving the renal parenchyma, collecting system, or perirenal tissue. The mechanism of gas formation is still unclear. Most cases occur in uncontrolled diabetes mellitus. Other risk factors include urinary tract obstruction and urinary tract infection with gas-forming microorganisms.¹ Two types of disease are recognized: type I is characterized by extensive destruction of renal parenchyma with the presence of mottled gas, and type II is characterized by renal or perirenal fluid collection with loculated gas or gas in the collecting system.² Type I emphysematous pyelonephritis has a more fulminant course and frequently requires surgical nephrectomy. For localized emphysematous pyelonephritis, the success rate of antibiotic treatment, with or without percutaneous drainage, has improved substantially in recent years.^{3,4} In general, the mortality rate is higher in type I than type II patients (69% vs. 18%).⁵ In this case, the computed tomography findings were compatible with the description of type II emphysematous pyelonephritis.

Necrotizing fasciitis is a deep-seated infection of subcutaneous tissue that is characterized by progressive necrosis of the fascia and fat.⁶ Diabetes mellitus is also the most common predisposing factor. The disease has a fulminant course and is associated with considerable mortality. There may be a remarkably rapid progression from an inapparent process to one associated with extensive destruction of subcutaneous tissues and signs of systemic toxicity. Early recognition and treatment by a combination of surgical debridement, appropriate antibiotics and optimal oxygenation of the infected tissues are mandatory.⁷

Both emphysematous pyelonephritis and necrotizing fasciitis are life-threatening conditions and require prompt aggressive medical and surgical intervention. The combined occurrence of the 2 entities is extremely unusual. Although necrotizing fasciitis can be caused by a retroperitoneal infection, only 2 cases of necrotizing fasciitis associated with emphysematous pyelonephritis have been described previously in the literature.⁸⁻¹⁰ A pathophysiology of emphysematous pyelonephritis extending to the adjacent subcutaneous tissues has been proposed.⁹ The superior and inferior lumbar triangles are 2 sites of anatomic weakness in the abdominal wall of the flank due to the absence of external muscular layers. The classic sign of subcutaneous discoloration

in the flank (Grey Turner sign) associated with acute pancreatitis and traumatic lumbar hernia are known to develop through these triangles.¹¹ The inferior lumbar triangle pathway also provides an anatomic explanation for the development of necrotizing fasciitis from the retroperitoneal infection.

In conclusion, we have presented a case of emphysematous pyelonephritis complicated with necrotizing fasciitis. Computed tomography showed characteristic findings of emphysematous pyelonephritis and perirenal gas-forming abscess with extension to the ipsilateral leg. This case not only represents a concurrence of the 2 uncommon entities but also alerts us that necrotizing fasciitis may be the presenting feature of emphysematous pyelonephritis. In cases of necrotizing fasciitis of the leg with no obvious source, a retroperitoneal nidus of infection may be considered.

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