INTRODUCTION

Patients of diabetes mellitus with uncontrolled blood glucose are predisposed to various infections. Infection is still the most common cause of morbidity and mortality in patients with diabetes in our country with a reported prevalence ranging from 33-46%. Uncommon but rapidly fatal infections like emphysematous pyelonephritis, emphysematous cystitis, emphysematous myositis, and rhino-cerebral mucormycosis occur more commonly in presence of poor glycemic control. Recurrent urinary tract infection is a predisposing factor for papillary necrosis, emphysematous pyelonephritis and emphysematous cystitis. Emphysematous cystitis (EC) is an uncommon but well described condition, in which collection of gas occurs in the bladder lumen, in the wall and in the perivesical tissues. Emphysematous myositis (EM) results from necrosis of muscle tissues followed by formation of gas in them. Both emphysematous cystitis and emphysematous myositis are rare diseases; simultaneous occurrence of both in a given patient has not been reported in the literature to the best of our knowledge.

CASE REPORT

A 51-year-old female was incidentally diagnosed diabetes 13 years back. She had history of recurrent urinary tract infections in previous 3 years with an episode of acute papillary necrosis with pyelo-ureteric junction obstruction for which she underwent pyelo-ureteric stenting a year earlier. Now she presented with history of pneumaturia for last one month and fever and pain in the right thigh for 12 days. She had no history of trauma and catheterization in recent past.

On examination, she was febrile, sick looking, had a pulse of 108/min regular, blood pressure of 140/96 mm Hg and respiratory rate of 28/minute. She had tenderness and induration in upper part of the right thigh and painful movement at right hip joint. She had bilateral pedal edema, proliferative diabetic retinopathy, and distal sensory and motor peripheral neuropathy. Other systemic examination was unremarkable. Investigations revealed hemoglobin 9.9 gm/dl, total leukocyte count 20,000/c mm with 87% polymorphs; 24 hr urine protein was 2.25g, serum creatinine 5.6 mg/dl, blood glucose was in the range of 300-400 mg/dl. Arterial blood gases (ABG) analysis was consistent with metabolic acidosis (pH 7.27, HCO3 14mEq/L); electrolytes and liver function tests were normal except serum albumin of 3.3 gm/dl. Urine routine examination showed 20-30 pus cells and 10-12 red blood cells per high power field and urine ketone was nil. Urine culture showed growth of Escherichia coli, sensitive to amikacin and nitrofurantoin.

X-ray right thigh revealed a large radiolucent area of size 2x3 cm suggestive of gas. Ultrasonography of same area showed bulky muscles with altered echotexture and ill-defined intermuscular planes and marked thickening of deep fascia along with reflective echogenic shadows suggestive of gas. Non-contrast computed tomography (NCCT) of the right thigh showed multiple specks of gas in vastus group of muscles (Fig. 1). NCCT of the abdomen showed features of hydronephrosis and hypodense area with density of air in the wall and lumen of the bladder (Fig. 2). Cause of hydronephrosis possibly would have been pelviureteric stricture due to recurrent urinary tract infection for which she underwent pelviureteric stenting. She was managed with intravenous saline, insulin, and cefotaxime, amikacin and metronidazole. Two weeks later, pain in the right thigh decreased and serum creatinine came down to 2.5 mg/dl and repeat CT of the
thigh showed disappearance of gas from thigh muscles (Fig. 3). Antibiotic therapy was continued for 6 weeks.

**DISCUSSION**

Infection in patients with diabetes is more severe than in an individual without diabetes, especially if the metabolic control is disrupted with developments of ketoacidosis. Emphysematous cystitis (EC) is not associated with any specific symptoms, however, sometimes low grade fever, crampy abdominal pain, or pneumaturia. Emphysematous myositis (EM) presents with fever, pain and tenderness at the local site. Our patient presented with fever, pain and tenderness in the right hip and thigh and history of pneumaturia. She did not have ketosis, but had metabolic acidosis due to acute renal failure.

*Escherichia coli* and *Enterobacter aerogenes* are the most common organisms isolated but other organisms have also been associated with emphysematous cystitis, including *Proteus mirabilis, Staphylococcus aureus, Streptococci, Clostridium perfringens, Nocardia and Candida albicans*. *Candida albicans* produces gas by fermentation of glucose and maltose. Patients with neurogenic bladder, urinary tract obstruction and with indwelling catheter are predisposed to this disease, as our patient had obstructive uropathy which predisposed her for recurrent urinary tract infection. Presumably, glucose and albumin in urine represent a substrate for the fermenting action of gas forming aerobes; producing carbon dioxide and hydrogen. The causative organisms for emphysematous myositis include *Klebsiella pneumoniae, Staphylococcus aureus, Clostridium perfringens and Escherichia coli*. Immunosuppressed states like uncontrolled diabetes, acquired immunodeficiency syndrome are major predisposing factors for emphysematous myositis. A low oxygen tension prevails in an ischaemic muscle due to sepsis which induces anaerobic metabolism, facultative anaerobes like *Escherichia coli* ferments glucose to carbon dioxide and hydrogen which appear as gas on imaging. On going ischaemia results in tissue necrosis, which further provides substrate for gas formation.

The diagnosis of these disorders can be made on ultrasonography, CECT of the involved region and sometimes cystoscopy. The diagnosis of EC and EM was confirmed in our patient on CT abdomen and thigh when investigated for pneumaturia and pain in right hip respectively.

Treatment strategies for both the disorders include good glycemic control by insulin, appropriate antibiotics covering gram-negative organisms and anaerobes and appropriate surgery if indicated. Management of EC requires treatment of predisposing factors and surgical debridement and some time even cystectomy. With timely diagnosis and appropriate medical management,
our patient recovered.

In conclusion, concurrent emphysematous cystitis and emphysematous myositis in type 2 diabetes have not been previously reported. Early detection and aggressive management is rewarding.

REFERENCES


