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Emphysematous Cystitis. A Rare Disease

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1. Abstract

Emphysematous cystitis is an uncommon infectious disease seen most commonly in diabetic patients and also in other immune compromised disease states. It is characterized by accumulation of gas with bladder wall by gas forming organisms. It is a severe urinary tract infection. Patients who have obstructive uropathy, immunodeficiency, neurogenic bladder, and recurrent UTIs are at high risk. These factors combined with glycosuria and impaired leukocyte function place diabetic patients at greater risk of complicated UTIs such as emphysematous cystitis. Overall, two-thirds of reported cases of emphysematous cystitis were diabetic and 64% were women. Early medical intervention can contribute to achieving a favorable prognosis without the need for surgical intervention. The prognosis of emphysematous cystitis can be rather serious due to the therapeutic failures which can occur when there is an ignorance of the physiopathological mechanisms of emphysematous cystitis. The aim of writing this report was to highlight rarity of disease, etiopathogenesis and treatment guidelines.

2. History and Case Description

A 65-year-old woman no known medical co morbidity presented to our emergency department with a 5-days history of lower abdominal pain. She also had fever, dysuria and urgency. Physical examination revealed lower abdominal tenderness. The patient was subjected to base line investigations including complete blood count, liver function test, kidney function test, routine urine examination and ultrasonography of abdomen. The patient had uncontrolled sugars (Table 1) and family history of diabetes in her mother. (Table 1) depicts her laboratory parameters. From the clinical scenario and laboratory examination, the patient had leukocytosis with renal failure. Routine urine examination revealed full-field pus cells. Her fund us revealed showed non proliferative diabetic retinopathy. Initially we made an impression of pyelonephritis (? emphysematous). However, Ultrasonography of abdomen showed diffuse bladder wall thickening and increased echogenicity. Abdominal X-ray showed gas within bladder wall (Figure 1a) and Computed Tomography of abdomen revealed intramural gas with a cobblestone or beaded appearance (Figure 1b). The condition was diagnosed as Emphysematous Cystitis with type 2 diabetes mellitus. The patient was managed with broad-spectrum antimicrobial agents and strict monitoring of vitals. In dwelling Foleys catheter placement was done for monitoring of urine output. The urine culture was showing growth of Escherichia coli. The patient was treated with modified dose of Meropenum (500mg IV 12hrly) for 10 days, stat dose of Amikacin (500mg IV) and modified ciprofloxacin (250 mg IV 12 hrly) for a week. Blood sugars were controlled with regular insulin started with 5units before breakfast, lunch and dinner and long acting insulin (injection Basalog 8 units) bed time. Patient recovered uneventfully. Her creatinine settled on 5th day of admission and was discharged on day 7th. The patient was discharged on Meropenum 500mg thrice-a-day orally for a week (Total duration of treatment 14 days). Catheter was removed immediately after normalization of creatinine. Patient was attached to endocrinology department for proper control of blood glucose.

Table 1: Hematological parameters and other laboratory indices

Parameters	Day 1	Day 3	Day 5
Hb gm/dl	13.7	12.7	13
TLC per mm3	18600	12700	8700
Plt per mm3	199	164	167
Urea mg/dl	74	64	43
Createinine(mg/dl)	1.54	1.17	0.87
Bilirubin mg/dl	0.4	-	-
Ast U/L	16	-	-
Alt U/L	11	-	-
Albumin g/dl	2.4	-	-
ALP	104	-	-
Urinary albumin	++	+	-
Urinary wbcs/HPF	90-100	-	20-30
Blood glucose(F) mg/dl	595	178	133
HBAIC	6.80%	-	-
FUNDUS	NPDR B/E	-	-

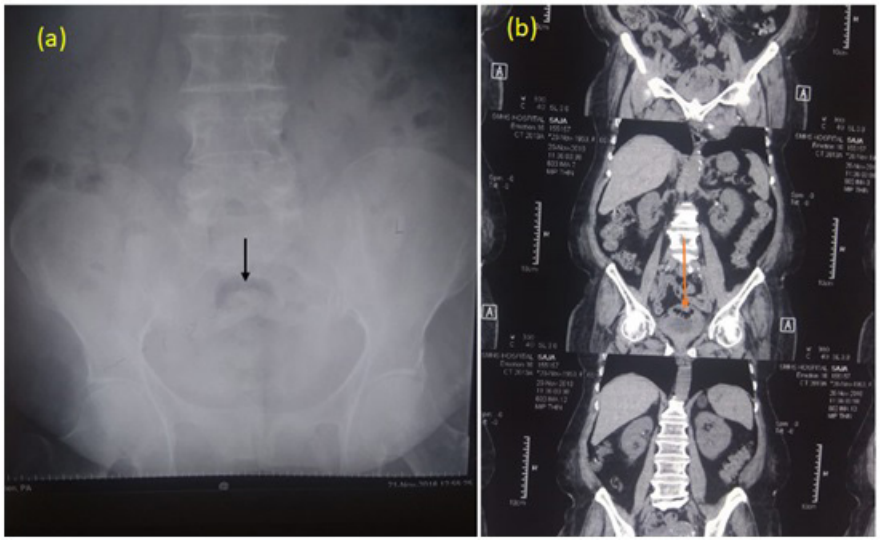

Figure 1: A plain radiograph (a) and a Computed Tomography (b) of Abdomen

3. Discussion

Emphysematous cystitis was first reported by Hueper in 1926 [1]. Emphysematous cystitis is an uncommon but severe lower urinary tract infection characterized by the accumulation of gas in and around the bladder wall produced by bacterial or fungal fermentation [2]. The organism most commonly responsible is E.coli (58%). Other organisms reported include Klebsiella pneumoniae, Pseudomonas aeruginosa, Proteus mirabilis, Candida albicans, Candida tropicalis, Aspergillus fumigatus, Staphylococcus aureus, Group D Streptococcus, Enterococcus faecalis, Enterobacter aerogenes, and Clostridium perfringens and Cl. Welchii [3]. The majorities of patients are elderly, female and have type 2 diabetes mellitus [2]. The clinical presentation of emphysematous cystitis is nonspecific ranging from asymptomatic to nausea, fever, chills, emesis, dysuria, pneumaturia, and abdominal pain [4-6] to severe peritonitis or septic shock. Emphysematous cystitis requires aggressive treatment with parenteral antibiotics, bladder drainage and control of sugar level and the overall average mortality rate is approximately 7% [2].

The disease is often associated with female sex, immune compromised state, diabetes mellitus, previous recurrent urinary tract infections, urinary stasis, and neurogenic bladder and in transplant recipients [7]. 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.

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. 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.

Patients who have obstructive uropathy, immunodeficiency, neurogenic bladder, and recurrent UTIs are at high risk [3, 8]. Emphysematous cystitis may have an atypical presentation, and sometimes the degree of inflammation is not related to the symptoms. Because it is most common in patients with diabetes mellitus, clinicians should be alert to signs of these potentially fatal infections. The effects of diabetes mellitus on the urinary tract include diabetic nephropathy, renal papillary necrosis, renal artery stenosis, and bladder dysfunction secondary to neuropathy. These factors combined with glycosuria and impaired leukocyte function place diabetic patients at greater risk of complicated UTIs such as emphysematous cystitis [9]. Overall, two-thirds of reported cases of emphysematous cystitis were diabetic and 64% were women. Since radiographic imaging is necessary for the diagnosis of emphysematous cystitis, an abdominal plain film (at minimum) should be ordered if the disease is suspected in diabetic patients or in cases of UTIs with unusual presentations. Plain radiographs of the abdomen reveal radiolucency within the lumen of the bladder as a ring of radiolucency outlining the bladder wall. Computed tomography of the abdomen is superior to plain radiographs as a diagnostic tool because it clarifies the extent and location of the gas collection as observed in our case. A pathological assessment of involved bladder tissue might show bladder wall thickening with vesicles of varying size, and microscopically there are multiple gas filled vesicles predominantly within the bladder mucosa, lined by flattened fibrocytes and multinucleated giant cells [10].

Most cases can be treated with a combination of antibiotics, bladder drainage and glycemic control. Emphysematous Cystitis is potentially life-threatening, with a mortality rate of 7%. Early medical intervention can contribute to achieving a favorable prognosis without the need for surgical intervention [2]. The prognosis of emphysematous cystitis can be rather serious due to the therapeutic failures which can occur when there is an ignorance of the physiopathological mechanisms of emphysematous cystitis. Actually, the prognosis in the case of emphysematous cystitis remains good provided that it is diagnosed in time and that an effective treatment is started without any delay. In the event of serious sepsis, the disease can evolve into the complications of emphysematous cystitis such as necrosis cystitis, emphysematous pyelonephritis, and despite antibiotic therapy, resuscitation and urine aspiration [11-13].

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