

Emphysematous Cystitis in Diabetic Patient: A Case Report and Review of Literature of 142 Cases

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Abstract:- Emphysematous cystitis(EC) is a rare disease with infection of urinary bladder with gas forming organisms. We report a case report of 88 year old female with emphysematous cystitis, followed by literature review. This diabetic patient with hematuria and lower back pain demonstrated emphysematous cystitis on Computer tomography(CT) caused by Klebsiellapneumoniae and managed with antibiotic and bladder drainage. A review of literature of 142 cases was done to analyse the presentation, causative organism, outcome.

Keywords:- Emphysematous , Cystitis , E Coli , Diabetes Mellitus.

I. INTRODUCTION

Emphysematous cystitis is the presence of gas within bladder wall and lumen. Main predisposing risk factors are female, elderly, diabetes mellitus. Clinically it can be seen with varied presentation. It can progress to urosepsis, emphysematous pyelonephritis, bladder necrosis.

II. CASE REPORT

An 88 yearsold diabetic female was admitted with low backache. During admission she developed hematuria with passage of blood clots. She had fever with urge incontinence. She had history of recurrent UTI in past. During physical examination, she was febrile with pulse rate 78/min, blood pressure 140/86mm Hg, respiratory rate was 20/min. mild suprapubic tenderness on palpation. No peritoneal signs and bowel sounds were normal.

Laboratory evaluation showed WBC count 8300 cells/ul[4000-10000] , Blood Urea 40 mg/dl[15-40], S. Creatinine -0.9mg/dl[0.5-1.4], blood glucose-240 mg/dl[70-140], S.Sodium -125mEq/l[135-145]. Macroscopically urine was cloudy with proteinuria, 30-50 WBC/HPF and nil RBC and some bacteria.

Klebsiella pneumonia was identified in urine culture. Ultrasonography showed multiple hyperechoic shadows with gaseous artifact. CT KUB confined with air in the urinary bladder wall and lumen with air fluid level confirming EC.(Figure 1). Broad spectrum antibiotic meropenem was initiated according to antibiotic sensitivity. Bladder drainage with foley catheter placed. IV fluids and

analgesics administered. IV Insulin initiated for hyperglycemia control. She improved with treatment. During follow up CT showed slight intramural gas.

III. DISCUSSION

Emphysematous cystitis is a relatively rare complicated cystitis with presence of gas within the bladder wall and lumen. Air within bladder lumen has been identified in human and animal autopsy and it was defined by Bailey in 1961 as “cystitis emphysematosa”.⁽¹⁾The gas constituents responsible are carbon dioxide, hydrogen , methane and nitrogen.⁽²⁾ It is due to the carbon dioxide gas bubbles which was formed from the bacterial fermentation of glucose.⁽²⁾The main risk factors include oldage, diabetes mellitus, neurogenic bladder, obstructive uropathy, bladder catheterization, chronic kidney disease.⁽³⁾

The mechanism involved in generation of gas in urinary tract is the combination of the infection of gas producing organisms, a high tissue glucose concentration, impaired tissue perfusion and decrease in immunity.⁽⁴⁾

Clinical features can vary from asymptomatic to severe sepsis.⁽⁵⁾Most common symptoms include abdominal pain, hematuria, features of cystitis like dysuria, frequency, urgency is present in only 10% cases.⁽⁶⁾Pneumaturia is a highly specific and presented rarely as symptom.⁽⁷⁾Incidental cases are detected in 7% cases.⁽⁵⁾ EC can progress to emphysematous pyelonephritis which has higher mortality than EC and requires early detection and management.⁽⁸⁾

Due to the risk of progression to severe sepsis prompt detection of EC is necessary. A systematic clinical assessment with good medical history including history of recurrent UTI, Bladder outlet obstruction(BOO), diabetic status, neurogenic bladder can detect sepsis associated with EC.⁽⁵⁾Urinalysis with gram stain and culture of both urine and blood is necessary to identify the pathogen and antibiotic sensitivity.

Radiological investigation plays a major role in diagnosing EC due to its non-specific presentation. X ray radiograph of abdomen & pelvis can detect rim of gas delineating the bladder wall with air fluid level or typical cobblestone appearance.⁽⁹⁾ Presence of bowel gas can be problematic at times. Xray is diagnostic in only 13%.⁽¹⁰⁾ CT is the ideal choice of image with demonstration of

intraluminal gas. It can assess the extent of disease and rule out complications like intra abdominal abscess, Emphysematous pyelonephritis involving renal parenchyma. Moreover, CT helps to identify other causes of bladder air like vesico colic, vesico vaginal fistula, trauma, gangrene of uterus, vagina, pneumotocystoides intestinalis.⁽¹¹⁾ Ultrasonography can show thickened bladder wall with echogenic area whereas cystoscopy can be done to rule out BOO.⁽¹²⁾

EC therapy requires early intervention due to risk of septic complication. 90% of cases are managed with medical therapy and 10% require surgical intervention along with medical therapy.⁽⁵⁾ Medical therapy includes antibiotic treatment, bladder drainage and controlling predisposing factors. Initially empirical parenteral therapy involves broad spectrum antibiotic like fluoroquinolone, penicillins with beta lactamase inhibitor, third generation cephalosporin, aminoglycoside.⁽¹³⁾ Later antibiotic should be converted to sensitivity according to the culture results and continued for 2-4 weeks depending on the response of treatment. Once fully recovered parenteral therapy can be switched to oral therapy.⁽¹³⁾

Early bladder drainage by continuous catheter drainage is required to rest the bladder especially in urinary retention, neurogenic bladder.⁽¹⁴⁾ Catheter drainage helps to monitor urinary output and irrigate the bladder to avoid clot retention.⁽⁶⁾ Effective control of blood glucose with intense insulin treatment is very important. Surgical therapy is indicated in case of non response to medical management, abscess, bladder necrosis, emphysematous pyelonephritis (EPN). Surgical intervention is decided according to disease severity in the form of surgical debridement, partial cystectomy, total cystectomy.⁽⁵⁾ Early percutaneous drainage (PCD) or nephrectomy may be required in case with associated emphysematous pyelonephritis depending on disease severity.⁽⁶⁾

142 cases were collected for literature review through a search in Pubmed database. All published articles in English over last 10 years (2011-2021) were identified using the key words, "emphysematous cystitis". The mean age of patient was 63 years (Table 1). Women were more affected than men (62% Vs 37% , ratio 1.6:1). Diabetes was recorded in 72% cases as main comorbidity. Around 25 cases had both emphysematous pyelonephritis and cystitis. The most common organism was *Escherichia Coli* (43%) followed by *Klebsiella pneumoniae* (23%) , mixed growth (<1%) , *Enterobacter* (<1%), *Candida albicans* (<1%). Most of the cases were treated with medical management with antibiotic administration and foley catheter drainage. DJ stenting and percutaneous drainage were done in 10 cases associated with renal involvement. Surgical intervention include nephrectomy (7 cases) and laparotomy (4 cases) for bladder perforation. Overall mortality was 0.07%.

IV. CONCLUSION

Emphysematous cystitis should be suspected in high risk (diabetic , elderly female) patients with complicated

UTIs when not responding to standard treatment. CT imaging will help to confirm the diagnosis. Antibiotics , bladder drainage is sufficient for most of the cases. EC complicated with coexistent EPN is a life threatening condition and will require additional intervention like DJ stenting , PCD, even nephrectomy. In necrotizing EC , surgical debridement is required to save the life.

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Table 1: Overview of demographics of age , comorbidity, organism ,outcome

Characteristics	Value
Mean <u>Age</u> years	63.89
	N%
Men	53(37.3)
Women	89(62.6)
Diabetic	103(72.5)
Associated emphysematous pyelonephritis	25(17.6)
Associated with bladder perforation	4 (0.02)
Death rate	10 (0.07)
Pathogens	N (%)
<u>E.Coli</u>	51(43)
Klebsiella pneumoniae	28(23)
Mixed growth	9(0.07)
Enterobacter cloacae	2(0.01)
Candida albicans	2(0.01)
Enterobacter aeruginosa	1(0.008)
Citrobacter <u>frenudii</u>	1(0.008)

Fig. 1: CT KUB showing gas locules in bladder wall and lumen.

