

Emphysematous Cystitis in Immunocompetent Host

Kalpesh Parmar*, Varinder Attri and Abhishek Chandna

**Department of Urology, PGIMER, Chandigarh, India.*

Received August 07, 2018; Accepted September 20, 2018; Published January 07, 2019

Gas within urinary tract was initially described in 1671 but the condition of air within bladder wall was defined by Bailey in 1961 and termed it “Cystitis emphysematous” [1,2]. The spectrum of gas-producing infections includes emphysematous pyelonephritis, emphysematous pyelitis, and emphysematous cystitis (EC). Emphysematous cystitis is classically described as gas within bladder wall with or without intraluminal gas which commonly affects middle – elderly aged diabetic females. Although a rare entity but numbers have risen in view of increased use of radiological imaging in patients with urinary tract infection. It is of no surprise that nearly half of the reported cases in literature of EC are from last 15 years.

EC has a more predilection for the elderly diabetic female patients. Thomas et al. [3] in his review series found the mean age being 61.9 year and male to female ratio of 1.8:1. Similar sex predilection and older age has been confirmed by Kuo et al. [4] and Grupper et al. in their studies [5]. Type 2 diabetes mellitus has been shown to be present in 2/3 of all cases and of these 64% were women [3,5]. These figures may well be even higher as a 1/3 of all cases of diabetes mellitus are undiagnosed. Clinical presentation of patients with EC is non-specific and varies individually. It may vary from purely asymptomatic to presentation with severe sepsis. Thomas et al. has described 7% of EC patients being diagnosed incidentally and were asymptomatic [3]. As stated by Kuo et al. [4], neither there are clinical findings which suggests towards the diagnosis of EC, nor does the severity of presentation correlate the tissue inflammation in EC. Clinical manifestations vary from asymptomatic or mildly symptomatic cases to cases with peritonitis or even with septic shock. Prevalent symptoms include dysuria, hematuria, increased frequency of urination, fever, supra pubic pain and pneumaturia. Classical symptoms of urinary tract infection like dysuria, frequency or urgency are described to be present in 53.3% of patients [5] with the most common symptom being supra pubic pain. Pneumaturia, which is more specific symptom, is rare presentation [6]. Atypical presentation includes subcutaneous emphysema [7], acute abdomen [8], decreased

general condition, diarrhea, sepsis, etc. EC is a possibly life-threatening disease because of rapid progression to bladder necrosis, pyelonephritis, urosepsis and death. To avoid these complications prompt evaluation and treatment is necessary.

The etiology and pathogenesis of EC remain poorly understood. Huang et al. [9] have postulated three critical conditions leading to EC – the presence of gas forming bacteria, high local tissue glucose levels and impaired tissue perfusion. Besides these, impaired immune system has been also proposed. Since diabetic patients are often having impaired defense mechanism, they are more prone for such complicated infection. The effect of DM on the urinary tract includes diabetic nephropathy, renal papillary necrosis, renal artery stenosis and bladder dysfunction secondary to neuropathy. These factors combined with glycosuria, place diabetic patients at greater risk of complicated UTIs such as EC. However, diabetics with no glycosuria, patients with well-controlled DM also develop emphysematous infections of the urinary tract [10]. In non-diabetic patients higher levels of urinary albumin, lactose, or tissue proteins can result in the formation of H₂ (hydrogen) and CO₂ (carbon dioxide) gas. In all cases it concerns an inappropriate host response to the causative microorganism. Urinary tract obstruction, urinary stasis, recurrent urinary tract infections, indwelling urethral catheter, neurogenic bladder, immunosuppressive comorbidity are predisposed to complicated UTI and EC [3,5]. Multiple gas producing organisms cause the EC with *E. coli* being the most common. Thomas et al. [3] have shown *E. coli* and *Klebsiella pneumonia* to be the most common pathogens in

Corresponding author: Dr. Kalpesh Parmar, M.S., MCh (Urology), Assistant Professor, Department of Urology, PGIMER, Chandigarh, India, Tel: 9915105062, E-mail: kalpesh010385@gmail.com

Citation: Parmar K, Attri V & Chandna A. (2019) Emphysematous Cystitis in Immunocompetent Host. Int J Surg Invasive Procedures, 2(1): 28-30.

Copyright: ©2019 Parmar K, Attri V & Chandna A. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

his study responsible for 58% and 21% of cases, respectively. Other organisms include *Enterobacter aerogens*, *Clostridium perfringens*, *Clostridium welchii*, *Candida albicans*, *Pseudomonas aeruginosa*, *Proteus mirabilis*, group D Streptococcus, *Staphylococcus aureus*, *Enterococcus fecalis*, etc. Most organisms are facultative aerobes, rarely anaerobes are involved or no organism is isolated.

Since EC presents with non-specific findings, the diagnosis is mainly achieved with imaging studies. Plain x-ray abdomen was most common imaging method used for diagnosis in reported cases in Thomas et al. series [3], used in 84% of patients which often showed ring of radiolucency in pelvis outlining bladder. In Grupper et al. series [5], KUB X-ray showed abnormal findings in 97.4% cases. However Kuo et al has showed plain x ray to be specific for EC findings in 13% of patients only [4]. Mainstay of diagnosis in present time remains Computed Tomography scan which is considered to be 100% sensitive for EC and besides showing severity and extent of disease, it also rules out other causes leading to gas in urinary bladder like vesicocolic fistula, neoplastic disease, diverticulosis, emphysematous pyelonephritis, intra-abdominal abscess. Cystoscopy though not required and not diagnostic, can suggest the predisposing cause leading to EC such as bladder outlet obstruction. Abnormal findings in cystoscopy like sub mucosal gas bubbles and hemorrhagic cystitis/necrosis were present in 47% of patients in Grupper et al. series [5]. Ultrasound and MRI are less valuable for EC. Laboratory analysis though non diagnostic, aids in establishing the severity of infection and subsequent response to treatment. Positive urine culture was found in 90.4% of patients with *E. coli* isolated in 57.4% of positive urine culture in a review series. Besides these leucocyturia, microhematuria/gross hematuria was other laboratory findings in this review series, found in 87.5% and 82.3% of patients respectively by Grupper et al. [5]. Other lab findings include raised CRP, leucocytosis, raised serum creatinine level, positive blood culture, etc.

EC is a possibly life-threatening disease because of rapid progression to bladder necrosis, bladder perforation, EP, urosepsis and death if diagnosis is delayed. Early diagnosis and treatment of emphysematous cystitis is extremely important to avoid these complications. Treatment of emphysematous cystitis includes broad spectrum antibiotics (beta lactams commonly), adequate hydration, urinary bladder drainage, blood glucose level control and correction of the underlying predisposing disease. Antibiotics should be switched to specific pathogens once sensitivity report available. There is no consensus for the duration of antibiotics although median of ten days have been shown in Grupper et al. series [5]. Gas usually gets absorbed once infection settles. In Thomas et al. series [3], 90% patients were managed conservatively and 10% patients not responding to conservative treatment required in addition surgical treatment in form of surgical debridement, partial

cystectomy, cystectomy with nephrectomy. Hyperbaric oxygen has been used as adjunctive therapy in patients with EC [11]. Mortality rate has been shown to be varied between 7%-9.4% in retrospective series which increases to 14% if upper tract is involved [3,5].

Although EC is generally considered to be prevalent in diabetic patients but its atypical presentation in young healthy immunocompetent patients has been described [12]. High suspicion for such disease and early imaging may prove fruitful in starting early antibiotics, thus limiting morbidity and mortality of patient.

REFERENCES

1. Taussig AF (1907). Pneumatouria with report of a case. Boston Med Surg J 156: 769-774.
2. Bailey H (1961) Cystitis emphysematosa; 19 cases with intraluminal gas and interstitial collection of gas. Am J Roentgenol Radium Ther Nucl Med 86: 850-862.
3. Thomas AA, Lane BR, Thomas AZ, Remer EM, Campbell SC, et al. (2007) Emphysematous cystitis: A review of 135 cases. Br J Urol Int 100: 17-20.
4. Kuo CY, Lin CY, Chen TC (2009) Clinical features and prognostic factors of emphysematous urinary tract infection. J Microbiol Immunol Infect 42: 393-400.
5. Grupper M, Kravtsov A, Potasman I (2007) Emphysematous cystitis: Illustrative case report and review of the literature. Medicine 86: 47-53.
6. Grayson DE, Abbott RM, Levy AD, Sherman PM (2002). Emphysematous infections of the abdomen and pelvis. A pictorial review. Radiographics 22: 543-561.
7. Sadek AR, Blake H, Mehta A (2011) Emphysematous cystitis with clinical subcutaneous emphysema. Int J Emerg Med 4: 26.
8. Chong SJ, Lim KW, Tan YM, Chow RK, Yip SK (2005) Atypical presentations of emphysematous cystitis. Surgeon 3: 109-112.
9. Huang JJ, Chen KW, Ruaan MK (1991) Mixed acid fermentation of glucose as a mechanism of emphysematous urinary tract infection. J Urol 146: 148-151.
10. Yang WH, Shen NC (1990) Gas-forming infection of the urinary tract: An investigation of fermentation as a mechanism. J Urol 143: 960-964
11. McCabe JB, Mc-Ginn Merritt W, Olsson D, Wright V, Camporesi EM (2004) Emphysematous cystitis: Rapid resolution of symptoms with hyperbaric treatment: A case report. Undersea and Hyperbaric Medical Society 31: 281-284.
12. Parmar K, Gupta M, Attri V, Khanna A (2018). A case of emphysematous cystitis presenting with acute urinary

retention in an immunocompetent host. J Surg 14: 49-51.