

Emphysematous Pyelonephritis

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Abstract

Emphysematous pyelonephritis (EPN) is a rare, severe gas-forming infection of renal parenchyma, Perirenal tissue and its surrounding areas. We report a case of diabetes mellitus that presented to the emergency department with abdominal pain, increase urine frequency and unable to pass stool after a trivial ground level fall, was diagnosed as perforation peritonitis. Early recognition in the emergency department prompted aggressive medical management followed by perinephric drainage and DJ Stenting due to which patient was successfully treated. Early diagnosis and management is a key to the prognosis in emphysematous pyelonephritis.

Keywords: Abdominal Pain; Pyelonephritis; Sepsis; Kidney; Drainage; Diabetes Mellitus.

Introduction

Emphysematous pyelonephritis is a serious, acute suppurative infection of the kidney characterized by production of intrarenal and, occasionally, perirenal gas. The disease is considered rare and is a potentially fatal infection (mortality rate as high as 30% to 40%)[9] with a variable clinical picture which ranges from mild abdominal pain to septic shock. It is mostly unilateral but is bilateral in 10% cases.

Most of the cases are seen in diabetics, about 90% reported according to different series; obstructive uropathy is the single most important contributing factor with it [2,4].

Computed tomography (CT) is the diagnostic radiological investigation.

Escherichia coli is the most common causative pathogen isolated in urine or pus culture in nearly 70% of the reported cases [3].

Researchers have postulated that vigorous resuscitation and appropriate medical treatment should be followed by immediate nephrectomy [1,3].

However, current advances in treatment allow patients to be treated with perinephric drainage in combination with broad spectrum antibiotics [5,7].

Case Report

A 67 yrs old diabetic, hypertensive female patient was brought to emergency department with chief complaints of fall on flat surface following which the patient complained of pain lower abdomen, high grade fever, dysuria with increased frequency of urine, constipation since 3 days. Patient was initially taken to primary hospital where patient was managed conservatively and was investigated, diagnosed perforation peritonitis and referred for exploratory laparotomy.

Vitals on arrival were RR 28/min; SpO₂:99% on RA; Pulse:71/min; BP:100/40 mmhg; Temperature:101°F CBG:320mg/dl. Investigations revealed Hb:12.8 gm/dl; TLC:13700 differentials N:93; Plt: 80000, Na⁺:125; Creat:0.9mg/dL; Urea:39mg%; CRP:36mg/dL; HbA1C: 13.8; Urine

examination showed pus cells= 40-50/hpf, presence of bacteria, Urine Glucose: 2+;

Examination revealed a conscious oriented patient with tenderness in right flank. NCCT Abdomen was done which revealed: Right kidney edematous with perinephric stranding with massive renal parenchymal, perinephric and paranephric air and free air in UB suggestive of Type 3b Emphysematous pyelonephritis with urosepsis (Figure 1 & 2).



Fig. 1: CT scan showing Right sided emphysematous pyelonephritis (EPN)



Fig. 2: CT scan showing Right sided emphysematous pyelonephritis (EPN)

Patient received intravenous fluids, antibiotics, prophylactically antifungal till C/S Reports were available along with supportive care in emergency department and was admitted in intensive care unit with diagnosis of emphysematous pyelonephritis.

Open perirenal drainage and DJ stenting was done in Emergency OT.

Gram staining of nephrostomy aspirate revealed

gram negative bacilli and culture showed *E. coli*.

Post operatively the patient was started on inotropes support, insulin, non-invasive ventilation and showed signs of improvement.

Follow-up CT scan done revealed resolving emphysematous pyelonephritis (Figure 3).

Patient had intermittent episodes of hypoxia and altered sensorium.

Patient started recovering clinically and was discharged for follow up in urology department.



Fig. 3: CT scan showing Right sided resolving emphysematous pyelonephritis (EPN)

Discussion

Emphysematous pyelonephritis (EPN) is a rare urological emergency characterized by necrotizing infection of the renal parenchyma and its surrounding tissues that results in the presence of gas in the renal parenchyma, collecting system or perinephric tissue [1,3].

Diabetes mellitus is the single most common associated factor. Up to 95% of patients with EPN have underlying uncontrolled diabetes mellitus. Other reported factors associated with the development of EPN are drug abuse, neurogenic bladder, alcoholism and anatomic anomaly. There is a preponderance of EPN in females; the female: male ratio reported in relatively small studies is 6 : 1. Increased susceptibility to UTI seems to be the reason for the higher incidence in females. The risk of developing EPN secondary to a urinary tract obstruction is 25–40% [1,4].

Escherichia coli remains the most common causative pathogen; the organism has been isolated on urine or pus cultures in nearly 70% of the reported cases. There have, however, been reports of *Proteus mirabilis*, *Klebsiella pneumoniae*, Group D

Streptococcus and coagulase negative Staphylococcus being the causative agent for EPN. Anaerobic microorganisms including Clostridium septicum, Candida albicans, Cryptococcus neoformans and Pneumocystis jiroveci have, in rare cases, been reported as the causative pathogen for EPN [6].

Renal ultrasound can confirm the presence of EPN in approximately 80% of cases, whereas CT scan is 100% sensitive. Thus, a CT scan is mandatory to

diagnose EPN if the index of suspicion is high. Huang and Tseng published a recent classification, which was based on the CT findings but described in detail. They classified EPN as follows: (1) Class 1: gas in the collecting system only; (2) Class 2: gas in the renal parenchyma without extension to extrarenal space; (3) Class 3A: extension of gas or abscess to perinephric space; Class 3B: extension of gas or abscess to pararenal space; and (4) Class 4: bilateral EPN or solitary kidney with EPN (Figure 4)[3].

Table 1: EPN classification systems

Classification	Radiological basis	Class
Michaeli et al.[1]	Plain radiograph and intravenous pyelogram	1. Gas in the renal parenchyma or perinephric tissue 2. Gas in the kidney and its surroundings 3. Extension of gas through fascia or bilateral disease
Wan et al[7]	CT	1. Renal necrosis with presence of gas but no fluid 2. Parenchymal gas associated with fluid in renal parenchyma, perinephric space or collecting system
Huang and Tseng[14]	CT	1. Gas in collecting system only 2. Parenchymal gas only 3A. Extension of gas into perinephric space 3B. Extension of gas into pararenal space 4. EPN in solitary kidney or bilateral disease

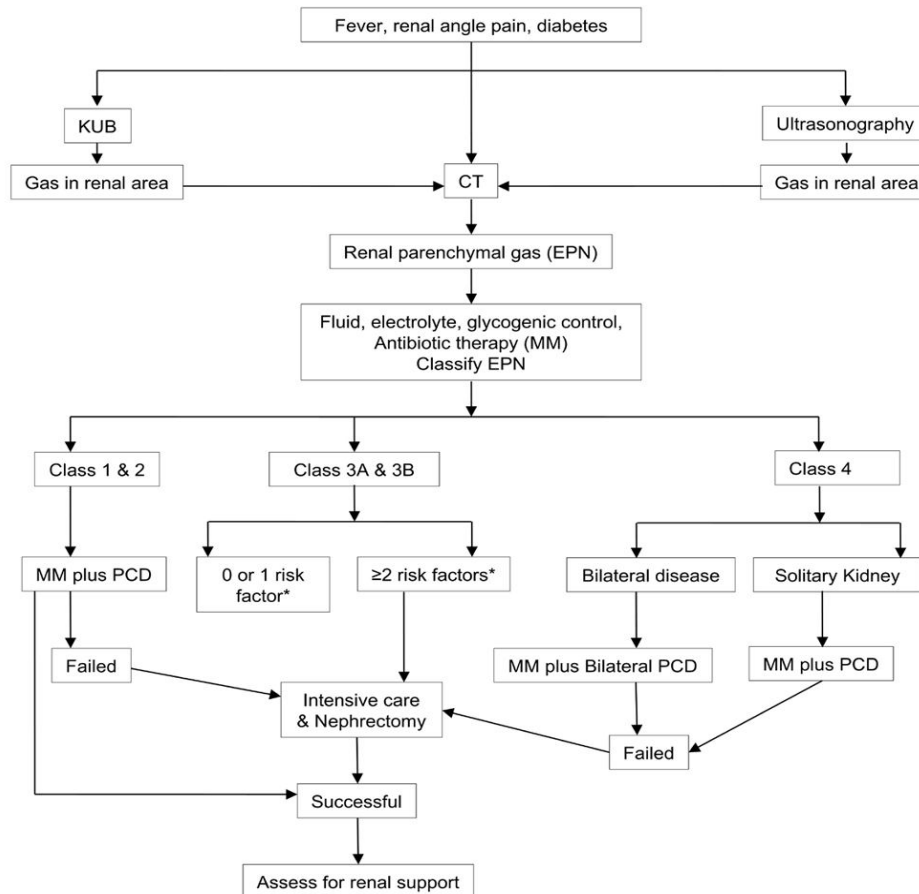


Fig. 4: Taken from Ubee, McGlynn L, Fordham M. Emphysematous pyelonephritis. BJU International 2011

Huang and Tseng et al. [6] proposed certain therapeutic modalities based upon their radiological classification system. Localized emphysematous pyelonephritis (class 1 and 2) is confronted by antibiotic treatment, combined with CT-guided percutaneous drainage. For extensive EPN (classes 3 and 4) without signs of organ dysfunction, antibiotic therapy combined with percutaneous catheter placement should be attempted (Figure 5). However nephrectomy should be promptly attempted in patients with extensive EPN and signs of organ dysfunction [3].

Conclusion

EPN is a potentially life threatening condition which is most commonly associated with poorly controlled diabetes. It requires a high index of suspicion in patients not responding to the routine management of pyelonephritis.

It is a radiological diagnosis and CT is the best investigation. Aggressive resuscitation should be given and the condition is currently treated by Medical management along with Percutaneous Drainage. Patients may not responding may require nephrectomy. ED Diagnosis and prominent management can safe nephrectomy. Reported mortality figures have improved since the 1970s but still are at 13.5% [8].

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