

EMPHYSEMATOUS PYELONEPHRITIS: A CASE REPORT

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ABSTRACT

Emphysematous pyelonephritis is a rare life threatening fulminant necrotizing infection of the kidney with high mortality. It is characterized by characteristic gas formation within or around the kidney on radiological investigations, while *E.Coli* is the most common causative organism. We report a case of 60 year old female suffering from diabetes mellitus since 3 years, who presented with high grade fever, abdominal pain, vomiting and dysuria. She was diagnosed as a case of emphysematous pyelonephritis and successfully treated.

KEYWORDS: Emphysematous pyelonephritis; Antibiotics.

INTRODUCTION

Diabetes mellitus is affecting the people in epidemic proportion. Emphysematous pyelonephritis (EPN) is a very rare life threatening infection of the kidneys with characteristic gas formation in the renal parenchyma or perirenal tissues [1 - 4]. It is commonly seen in patients of uncontrolled diabetes mellitus with bilateral renal involvement [5]. *E coli* is the most common causative organism in 70% cases [4]. Computed tomography scan (CT) is the most sensitive investigation (100%) to confirm the diagnosis. EPN may present with nonspecific symptoms like abdominal pain, fever, nausea, vomiting with sudden clinical deterioration. Treatment includes antibiotics, nephrostomy and nephrectomy [1,4]. It carries high mortality of 60-75% with antibiotics alone and 21-29 % with antibiotics and nephrectomy [6].

CASE REPORT

We report a case of 60 year old female, a known diabetic since 3 years and on oral hypoglycaemic agents. Her blood sugar levels were not controlled. She complained of high grade fever 102o F with rigors and chills, pain right lower abdomen, vomiting and dysuria since 7 days. There was no history of diarrhoea and jaundice. On examination her vitals were BP 120/80 mmHg, Pulse rate 80 beats/min regular and respiratory rate 20/min. abdominal examination revealed tenderness in right lower abdomen without hepato-

splenomegaly. Cardiovascular, respiratory and nervous system examination revealed no abnormality.

Laboratory investigations on admission revealed hemoglobin 10.2 g/dl; Total leucocyte count 17200/mm³, Differential cell count P:80, L:20, E:0, B: 0, Blood urea 70 mg/dl, Serum creatinine 1.9 mg/dl, Fasting blood glucose 190 mg/dl, HBA1c 8.2%, ESR 25 mm at the end of first hour. ECG was showing tachycardia. X-ray chest and 2D Echocardiography was normal. Urine examination showed sugar 2+ along with plenty of pus cells. Urine examination was sent for culture and sensitivity. Ketone bodies were negative. Liver, lipid and electrolytes profile were normal.

Ultrasound abdomen revealed presence of gas in the right kidney suggestive of EPN (Figure 1) which was confirmed by CT scan abdomen (Figure 2).



Figure 1. USG abdomen demonstrating gas accumulation in right kidney parenchyma.



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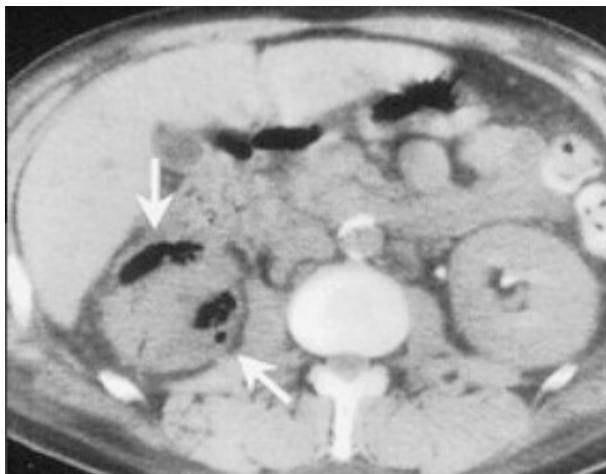


Figure 2. Contrast CT demonstrating gas accumulation limited to the right kidney parenchyma

Based on clinical symptomatology and radiological findings, a diagnosis of EPN was made, so the patient was started on normal saline, subcutaneous short acting insulin, inj ceftriaxone. In the meantime urine culture report showed growth of *E Coli* sensitive to meropenem. We switched to parenteral merpenam 1 gm/ twice daily and metronidazole 500mg/thrice daily which were continued for 2 weeks. There was marked clinical improvement with resolution of symptoms. She was discharged on short acting insulin along with ciprofloxacin. She did not need nephrostomy/ nephrectomy. Her CT scan abdomen reported at 1 month interval was normal.

DISCUSSION

EPN is an acute and chronic necrotizing pyelonephritis characterized by gas formation within renal parenchyma or perirenal tissues. It was first described by Kelly and McCallum with greater incidence in females over males. Predisposing factors include uncontrolled diabetes mellitus, acidosis, impaired immune mechanisms, dehydration, electrolyte disturbance, urinary calculi, calyceal stenosis etc. Infecting organisms usually consist of mixed flora including *E.coli* (70 % cases), *Klebsiella pneumonia*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Enterobacter* and *candida* [4,7,8]. These are fermenting organisms, which provide hydrogen, oxygen, nitrogen, and carbon dioxide [9].

Common clinical features include fever, abdominal pain, dysuria, disorientation, confusion and septicaemia[1]. Our patient presented with hyperglycaemia, fever, dysuria, pain right lower abdomen and pyuria suggestive of pyelonephritis. However plain X-ray abdomen, U/S and CT abdomen revealed presence of gas in renal parenchyma thus confirming the diagnosis of EPN.

Ultrasound and CT abdomen is the main investigation for diagnosis and treatment [1,4,10]. According to CT, EPN is classified into 4 types depending upon anatomical location of gas [1,10]. Type I is characterized by gas confined to collecting system; Type II gas confined to

renal parenchyma; Type III a gas extending to perinephric region; Type III b gas extending beyond Gerota fascia while Type IV characterized by bilateral EPN. Our patient was in class 2, conservative treatment started with iv fluids, sugar monitoring and responded well to meropenem and metronidazole given for 2 weeks and recovered completely without need for nephrostomy/ nephrectomy.

Good hydration, fluid resuscitation, and treatment with systemic antibiotics are the first line management in EPN. A monitored-care facility may be needed for patients in shock. Control of diabetes and maintenance of adequate fluid balance should be achieved quickly. No contraindications exist for the treatment of EPN. The infection often has a fulminating course and can be fatal if left untreated. However, surgical intervention should be performed only after stabilization of the patient's cardiorespiratory status

EPN is medical emergency, must be treated with aggressive medical management and, possibly, surgical intervention [11] to reduce mortality.

Conservative treatment using percutaneous drainage with antibiotics is indicated in following conditions: [12,13]

- * Patients with compromised renal function.
- * Early cases associated with gas in the collecting system alone and patient is in otherwise in stable condition.
- * Class 1 and class 2 EPN.
- * Class 3 and class 4 EPN - In the presence of fewer than 2 risk factors (eg, thrombocytopenia, elevated serum creatinine levels, altered sensorium, shock).

The use of nephrectomy is indicated as follows [14]

- * Treatment of choice for most patients.
- * No access to percutaneous drainage or internal stenting (after patient is stabilized).
- * Gas in the renal parenchyma or "dry-type" EPN.
- * Possibly bilateral nephrectomy in patients with bilateral EPN.
- * Class 3 and class 4 EPN - In the presence of more than 2 risk factors (eg, thrombocytopenia, elevated serum creatinine, altered sensorium, shock).

Lu et al recommend tailoring initial therapy according to the classification system of Huang and Tseng and risk factors for resistance, as follows[8]:

- * Class 1: A third-generation cephalosporin, with or without amikacin, plus percutaneous catheter drainage in patients with obstructive uropathy
- * Class 2, 3, and 4: without risk factors – A third-generation cephalosporin, with or without amikacin, plus percutaneous catheter drainage
- * Class 2, 3, and 4: with risk factors – Carbapenem with or without vancomycin plus percutaneous catheter drainage

CONCLUSION

Emphysematous pyelonephritis (EPN) is a severe, necrotizing renal parenchymal infection that is character-

ized by the production of intraparenchymal gas. EPN predominantly affects female diabetics, and can occur in insulin-dependent and non-insulin-dependent patients in the absence of ureteric obstruction. Non-diabetic patients can also develop EPN, but often have ureteric obstruction and do not seem to develop such extensive disease.

EPN should be suspected in a diabetic patient with uncontrolled diabetes, pyuria, abdominal pain, fever, vomiting not responding to appropriate antibiotics. It is a life threatening fatal condition which requires early diagnosis and prompt use of higher antibiotics along with control of diabetes in order to prevent complications and reduce mortality

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