

# A Rare Case of Emphysematous Pyelonephritis, Mimicking Perforation Peritonitis in a Non-diabetic

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## ABSTRACT

Emphysematous Pyelonephritis (EPN) is rare, severe gas-forming infection of renal parenchyma and its surrounding areas. This is a rare case of EPN in a non-diabetic, middle aged man who presented to the emergency department with diffuse abdominal pain, tenderness, guarding and rigidity throughout the abdominal wall with acute urinary retention. Foley catheter and infant feeding tube did not pass, indicating the possibility of a stricture per urethrally. An emergency suprapubic catheterisation was done. An erect abdomen radiograph was done which showed gas shadow in the left kidney and air foci on the right side. An urgent contrast CT scan was done which was suggestive of bowel perforation and interbowel fluid along with air foci in the left kidney, suggestive of EPN. Patient was taken for an emergency exploratory laparotomy.

EPN is indeed rare entity presenting clinically as perforation peritonitis. So, the surgeon should adapt an aggressive approach in treating this condition and an early nephrectomy should not be delayed.

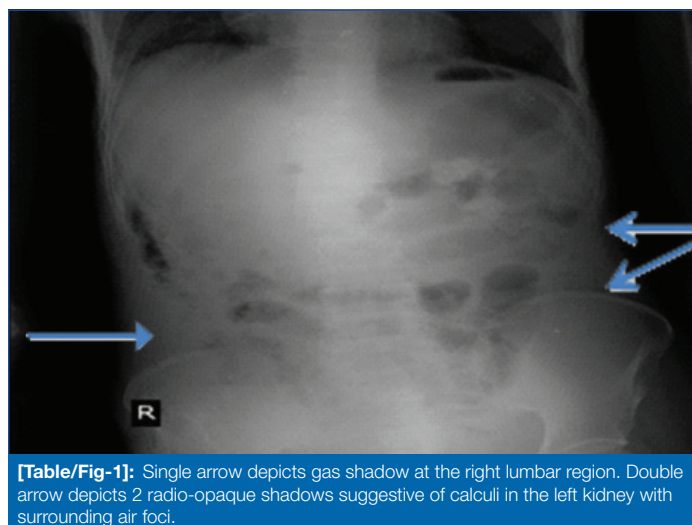
**Keywords:** Air foci, Exploratory laparotomy, Nephrectomy, Supra-pubic catheterisation

## CASE REPORT

A 50-year-old non-diabetic male patient came to the emergency department with complaints of diffuse abdominal pain since 15 days, urinary retention since two days. Patient also had history of fever, burning micturition and vomiting since 10 days.

Per abdominal examination showed diffuse tenderness with guarding over whole abdomen. Auscultation revealed absence of bowel sounds i.e., silent abdomen. Ultrasound abdomen and pelvis showed inter-bowel free fluid.

X-ray abdomen erect [Table/Fig-1] was done which revealed calculus in the left kidney with radio-opaque shadows surrounded by air foci. Gas shadow could also be visualised at the right lumbar region. Foleys catheterisation failed due to mechanical obstruction due to stricture in the urethra.



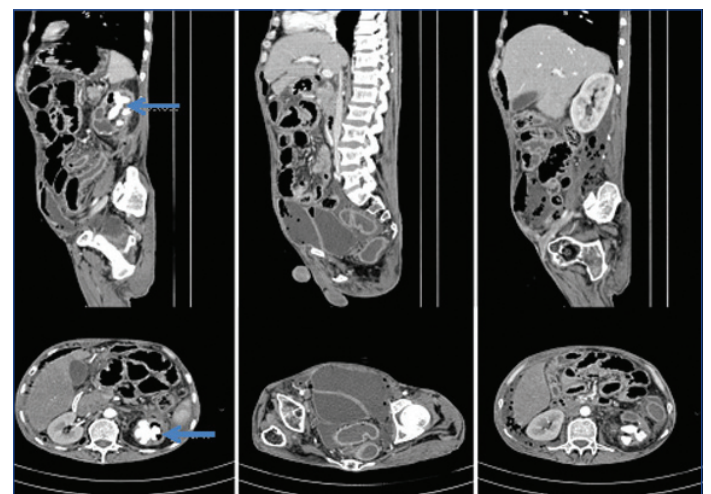
**[Table/Fig-1]:** Single arrow depicts gas shadow at the right lumbar region. Double arrow depicts 2 radio-opaque shadows suggestive of calculi in the left kidney with surrounding air foci.

Blood investigations revealed leukocytosis (17.9x1000/ $\mu$ L), thrombocytopenia and peripheral smear showed neutrophilic leukocytosis with band forms. Erythrocyte Sedimentation Rate (ESR) was also raised to a level of 95 mm/ 1<sup>st</sup> hour.

There was hypoproteinemia (2.4 g/L). Urea and Creatinine were under normal range. Immediate supra-pubic catheterisation was

done and urine aspirate sent for examination showed 8 to 10 pus cells per high power field (hpf). Urine culture was positive for *Klebsiella pneumoniae*, with sensitivity for Imipenem.

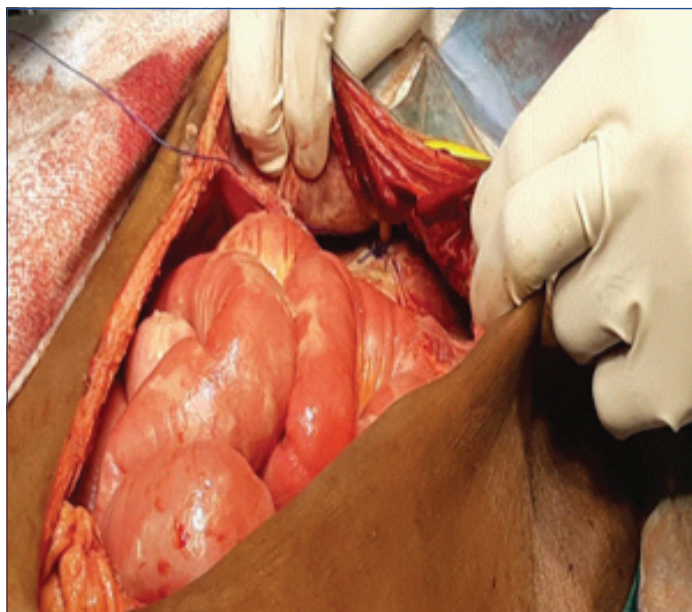
Contrast enhanced Computed Tomography (CT) scan of abdomen and pelvis [Table/Fig-2] was done which revealed air mixed collection in the peritoneal cavity with thickened bowel loops and inter-bowel free fluid along with left sided stag horn calculus and EPN with retroperitoneal collection with air foci with prevesical extension and collection with air foci within. Dense calcifications within the prostate gland were noted.



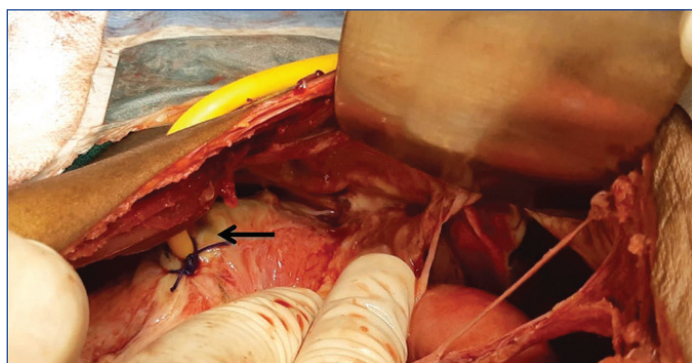
**[Table/Fig-2]:** Features of EPN with staghorn calculus, dense collection with air foci in the prevesical space, air foci in the retroperitoneal region of the opposite side.

Patient was taken for emergency exploratory laparotomy in view of perforation peritonitis. Intra-operatively, there were pus flakes over the bowel loops [Table/Fig-3], prevesical region [Table/Fig-4] and inflamed parietal peritoneum. Bowel was traced systematically from stomach, duodenum, duodeno-jejunal flexure upto the ileo-caecal junction: no obvious perforation was noted. There was no perforation in large intestine also. There was bulge noted in the parietal peritoneum over bilateral iliac fossa with purulent exudation into the peritoneal cavity. Incision was taken through the bulge and around 750 mL of frank pus was aspirated. Incision was extended upto

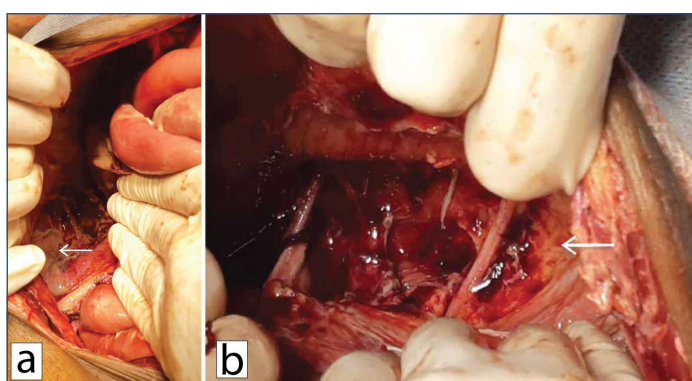
the retroperitoneal region on both sides [Table/Fig-5a,b]. Inflamed perinephric fat was visualised on the left side. Retroperitoneal drain was placed on both the sides.



[Table/Fig-3]: Image showing pus flakes in the abdomen.



[Table/Fig-4]: Image shows Suprapubic Catheterisation (SPC) with pus in the prevesical space.



[Table/Fig-5a,b]: Image shows pus in the right and left retroperitoneal region, respectively. (Gonadal vessels are visualised).

Patient was shifted under critical care unit with institution of IV Imipenem. Image guided per-cutaneous drainage was done on the left side postoperatively. Urine with pus flakes was seen, which resolved in few days and the patient was stable at four weeks follow-up.

## DISCUSSION

EPN is characterised as a necrotising infection of the renal parenchyma and its surrounding areas by gas forming organism, as a result of which, there is gas in and around the renal parenchyma, collecting tubules, or peri-nephric tissue [1,2]. It commonly occurs in diabetics and patients with urinary tract obstruction in which *E.coli* and *K.pneumoniae* is the most common pathogens responsible [3].

As its common occurrence in the diabetic patients with high glucose level in the tissues, this indeed acts as a substrate for microbes like *E.coli* and upon its fermentation carbon dioxide is produced [4]. EPN is also reported in non-diabetic patients [5].

EPN is an urological emergency. Advancements in imaging and wide spread availability of CT scan have rendered diagnosis of a higher number of cases and even atypical presentation (as shown above). First case of EPN was reported in 1898 by Kelly HA and MacCallum WG [6]. In this case, the left kidney was primarily involved, corresponding to the results of other series [7,8].

A high tissue glucose level seen in diabetics provides gas-forming organism with an environment favorable for their growth and rapid catabolism, which can cause the immense production of gas [9]. Rather, Shokeir AA et al., has shown that urinary tract obstruction was evident in all the non-diabetic patients and in some diabetics [10].

Common clinical presentation of EPN (i.e. fever, flank pain, and pyuria) though is non-specific, and could be the presentation of upper Urinary Tract Infection (UTI) as well. However, thrombocytopenia, acute renal function impairment, disturbance of consciousness, and shock can be the presentation of severe form of this disease [7]. Similarly in this case, patient had shock (BP 90/60 mm of Hg), fever, pyuria (8 to 10 pus cells/hpf) with associated diffuse abdominal pain. The diagnosis of this disease is based on clinical suspicion and an early CT scan can confirm and show the extent of the disease.

The most common differential diagnosis of EPN is calculus, but it can be differentiated by the presence of "clean" posterior acoustic shadowing on an Ultrasonography, which indeed shows posterior "dirty" acoustic shadowing in cases of EPN [11]. Another condition which deserves a mention here is emphysematous pyelitis, but this is a benign condition and results in complete resolution on antibiotic treatment alone [12].

Though many classifications have been introduced but radiological classification by Huang JJ and Tseng CC is most widely accepted [7]. On the basis of the radiological findings on CT scan, they are categorised into the following classes:

- (1) **Class 1:** Gas in the collecting system only;
- (2) **Class 2:** Gas in the renal parenchyma without extension to extra renal space;
- (3) **Class 3A:** Extension of gas or abscess to perinephric space;  
**Class 3B:** extension of gas or abscess to pararenal space;
- (4) **Class 4:** Bilateral EPN or solitary kidney with EPN.

Patients are assessed for the risk factors such as thrombocytopenia, acute renal function impairment, disturbance of consciousness, shock and managed accordingly. Patients with (class 1 or 2), per cutaneous drain and/or relief of urinary tract obstruction (if it exists) with antibiotic coverage can offer a good outcome. For severe cases of EPN (class 3 or 4) with less than two risk factors, per cutaneous drainage with antibiotic treatment can be given due to its high success rate for patients and conservation of as much renal function as possible. Emergency nephrectomy should be done for severe EPN with a fulminant course (i.e.,  $\geq 2$  risk factors) or for cases with an unsuccessful Percutaneous Drainage (PCD) [7]. Similarly in this patient with Class 3 EPN with only shock as risk factor, percutaneous nephrostomy with antibiotic treatment was given. Aswathaman K et al., in their study have shown similar successful outcome for conservative treatment on patients [1].

## CONCLUSION(S)

Surgeons should adapt an aggressive approach in managing such cases. Immediate CT scan to classify the disease with vigorous resuscitation should be done. The present case with with single risk factor (shock) was managed conservatively with antibiotics.

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