

Different Imaging Modalities for Evaluating Emphysematous Pyelonephritis (EPN); a Life Threatening Urological Emergency – A case report

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ABSTRACT

Emphysematous pyelonephritis (EPN) is a severe necrotizing infection of the renal parenchyma; it causes gas formation within the collecting system, renal parenchyma, and/or perirenal tissues. In this reported case, a female patient of 40 years was admitted in a tertiary hospital with history of severe left flank pain, lower abdominal pain, fever, vomiting and scanty micturition for three days. Ultrasonogram showed-normal right kidney but left renal bed reveals extensive air obscuring visualization of left kidney with probe tenderness in left flank. Contrast CT scan of KUB shows larger left kidney with extensive air (CT number = -1000 HU) within the renal parenchyma, collecting systems and perinephric space. This case was diagnosed as EPN. After conservative treatment patient was improved significantly.

Key Ward: Emphysematous pyelonephritis, Diabetes mellitus.

INTRODUCTION

Emphysematous pyelonephritis (EPN) is a severe necrotizing infection of the renal parenchyma; it causes gas formation within the collecting system, renal parenchyma, and/or perirenal tissues. The clinical course of EPN can be severe and life-threatening if not recognized and treated promptly. EPN is common in persons with diabetes mellitus, and the presentation of EPN is similar to that of acute pyelonephritis. Ultrasonogram diagnosis was poor -visualization of left kidney by gas with cystitis

CASE REPORT

A female patient of 40 years was admitted in a tertiary hospital with history of severe left flank pain, lower abdominal pain, fever, vomiting and scanty micturition

for three days. She had diabetes for many years. She had drug history of Insulin, Compid, Ceftron, and Reset. On physical examination patient was anemic, temperature was raised, tenderness present in left flank. On biochemical test, there was raised serum creatinine level 2.3 mg/dl, On Urine RE: Pus cell-15-30, RBC-5-7, albumin, sugar and ketone body was present. Fasting blood sugar was -18.0 m mol/l. Patient was clinically provisionally diagnosed as acute abdomen with uncontrolled diabetes mellitus with UTI.

Patient was sent to the radiology department for further assessment. Ultrasonogram showed- normal right kidney but left renal bed reveals extensive air obscuring visualization of left kidney with probe tenderness in left flank. A poorly outlined larger renal area could be seen. Internal echoes were seen in urinary bladder. Other abdominal organs appeared normal. Ultrasonogram diagnosis was poor -visualization of left kidney by gas with cystitis (Figure 1).

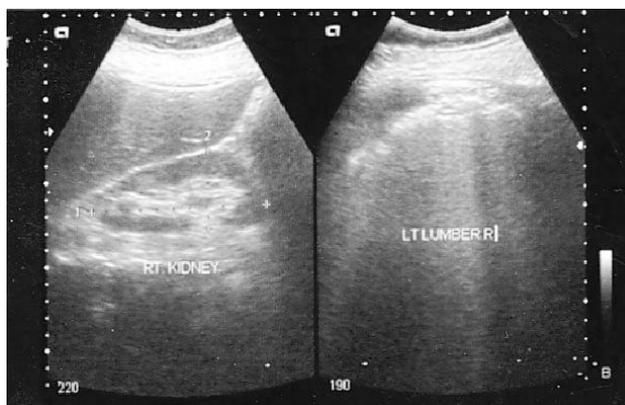


Figure-1: Ultrasonogram of both kidneys: Normal right kidney, gas interfering poor visualization of left kidney.

Patient had a previous normal Ultrasonogram report of KUB region. X-Ray abdomen in erect posture showed gas within left renal parenchyma & perinephric space (Figure 2).



Figure 2: X-Ray abdomen in erect posture shows gas within left renal parenchyma & peri nephric space.

Abdominal CT was done. Contrast CT scan of KUB shows larger left kidney with extensive air (CT number = -1000 HU) within the renal parenchyma, collecting systems and perinephric space. Diffuse parenchymal destruction of left kidney with extensive mottled gas was seen. CT confirmed the diagnosis of emphysematous pyelonephritis (EPN) of left kidney (Figure 3).



Figure 3: Contrast CT scan KUB shows extensive low density (CT Number = - 1000H.U) within the renal parenchyma, collecting system & perinephric space.

Patient was treated conservatively with proper antibiotic, insulin and electrolyte imbalance was corrected. After few days follow up, ultrasonogram showed partial visualization of left kidney. Patient outcome was good and ultrasound imaging showed better visualization of left kidney than previous scan (Figure 4).

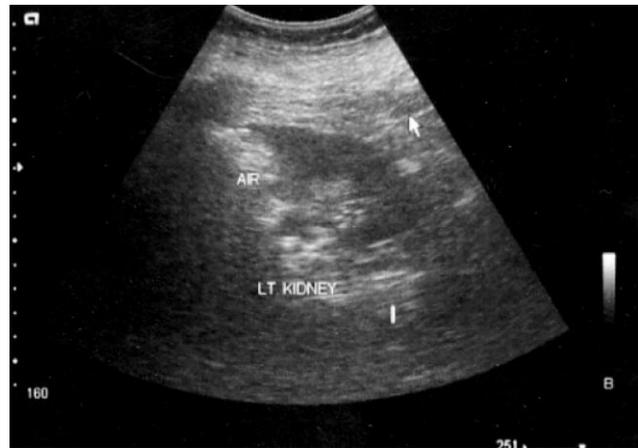


Figure 4: After conservative treatment, follow up ultrasonogram shows partial visualization of left kidney.

After recovery isotope renogram by 99mTechnetium diethylene triamine pentaacetic acid (99m Tc DTPA) was done for further evaluation which showed partial obstructive uropathy with mild parenchymal insufficiency (PI) in left kidney with 41 % split function (Figure 5).

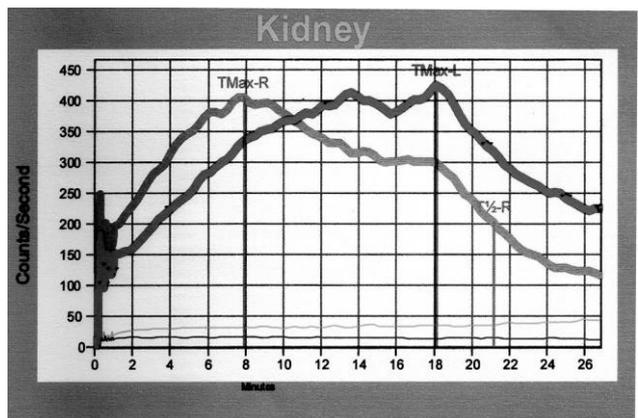


Figure 5: After recovery of the patient, 99m Tc DTPA renogram shows partial obstructive uropathy with mild parenchymal insufficiency (PI) in left kidney.

DISCUSSION

EPN is a relatively uncommon life threatening bacterial infection characterized by gas formation within renal

parenchyma or the perinephric space (1). The mean age of patients with EPN is reported as 55 years, with a range of 19-81 years. The condition is 6 times more common in women (2). Ninety-five percent of patients have diabetes. In most patients, the diabetes is uncontrolled, with high levels of glycosylated hemoglobin (72%) or high levels of blood sugar. In this reported case, the patient was 40 years female and diabetic. Rare cases have been reported in persons who do not have diabetes, with renal failure and immune suppression as contributing factors. Patient had EPN in left kidney, in literature it was reported that the left kidney is affected more commonly than the right. Bilateral cases have also been reported. Pregnancy can also be complicated by EPN (3). Transplanted kidneys may be susceptible to EPN because of associated high-risk factors in the recipient such as diabetes and immunosuppression. Coexisting morbidities include alcoholism, malnourishment, renal calculi, and diabetic ketoacidosis.

Among the bacteria associated with EPN, *Escherichia coli* is most common, *Klebsiella*, *Proteus*, *Pseudomonas*, and *Streptococcus* species are also found in patients with EPN. Mixed organisms are also observed. The major components of the gas in EPN include nitrogen (60%), hydrogen (15%), carbon dioxide (5%), and oxygen (8%) (2). Diabetic microangiopathy may also contribute to the slow transport of catabolic products and may lead to accumulation of gas.

Patients typically present with fever, abdominal or flank pain, nausea and vomiting, dyspnea, acute renal impairment, shock, and thrombocytopenia-similar findings were noticed in this case (3). Crepitus over the flank area may occur in advanced cases of EPN. Pneumaturia is uncommon unless emphysematous cystitis is present. Subcutaneous emphysema and pneumomediastinum have recently been reported in a case of EPN (3).

Two types of distribution of the gas have been found to correlate with prognosis. Type I EPN is characterized by renal parenchymal destruction that manifests with either streaky or mottled areas of gas. Intra- or extrarenal fluid

collections are notably absent. In contradistinction, type II EPN is characterized by renal or perirenal fluid collections that are directly associated with bubbly or loculated gas or by gas within the urinary collecting system. Type I disease has a more aggressive clinical course, with a shorter interval between initial presentation and death. They reported mortality rates of 69% for patients with type I disease and 18% for patients with type II disease (4). More recent literature that advocates aggressive medical treatment along with percutaneous drainage and partial or complete nephrectomy reported much better results. Mortality rates for both types were both approximately 8% (5).

Conventional radiography demonstrates either mottled gas within the renal fossa or crescentic collections of gas within the Gerota fascia (a finding indicative of infection extending into the perinephric spaces). Ultrasound and CT findings of this case could be correlated with other reported findings such as enlarged kidney with high-amplitude, nondependent echoes within the renal parenchyma or collecting system with the distal shadowing having reverberations and low-level echoes that are nicknamed "dirty shadowing." (4). The echogenic foci appear different than those seen in typical stone disease. Confounding factors in a Ultrasonogram evaluation of this disease are the presence of adjacent bowel gas or calculi, which may cause confusion and interpretive errors (4).

CT is the modality of choice for evaluating patients with EPN (3). Findings include parenchymal enlargement and destruction, small bubbly or linear streaks of gas, fluid collections, gas-fluid levels, and focal tissue necrosis with or without abscess (4,6).

Patients with EPN should be treated with aggressive medical management and, possibly, prompt surgical intervention. Conservative treatment is percutaneous drainage with antibiotics may given those with compromised renal function and in early cases of EPN type I & II associated with gas in the collecting system alone and patient is in otherwise in stable condition. Surgical treatment is nephrectomy which is the treatment of choice for most patients, where there is no

access to percutaneous drainage or internal stenting (after patient is stabilized) or gas in the renal parenchyma or "dry-type" EPN and in the presence of more than two risk factors (eg, thrombocytopenia, elevated serum creatinine, altered sensorium, shock). Emergency nephrectomy is the treatment of choice of EPN I. Percutaneous drainage is recommended for EPN

II. CT guided drainage appears to have good results in patients whom surgery is contraindicated- solitary kidney, bilateral disease or disease with renal or perirenal fluid collection. Surgical intervention should be performed only after stabilization of the cardio respiratory status.

CONCLUSION

EPN often has a fulminating course and can be fatal if left untreated. Early recognition is very important. While clinical and pathologic findings vary, Ultrasonogram & characteristic radiological findings particularly CT scan findings allow accurate diagnosis,

that can help to provide an opportunity for patient counseling, emergency management and tertiary level care. So, therefore failure to see a kidney obscuring by air in Ultrasonogram in a septic patient warrants CT scan for better visualization, to confirm diagnosis of EPN & for further management.

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