

Emphysematous Pyelonephritis in Diabetic Patient: A Case Report

Singh S*

Department of Anesthesia & Critical Care, Sheikh Khalifa Medical City Ajman, UAE

*Corresponding author: Shailendra Singh, Department of Anesthesia & critical care, Sheikh Khalifa Medical City Ajman, UAE, Email: drssingh2007@gmail.com

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Abstract

Background: EPN is a severe necrotizing infection of the kidney and its surroundings. It is an uncommon infection, occurring mostly in patients with diabetes and more commonly in females. It has a high mortality rate if not treated by early intervention or by surgical approach.

Case report: We herein report a case with diagnosed diabetes mellitus admitted to the emergency room with symptoms of pyelonephritis. With the help of radiological modalities, we were able to find gas in the renal parenchyma, which established the diagnosis of EPN. The patient was treated successfully.

Conclusion: EPN is a medical emergency so after early diagnosis, It requires proper attention in the selection of treatment so that we can avoid high mortality related to this condition.

Keywords: Kidney; Pyelonephritis; CT Scan; Diabetes-Mellitus

Introduction

Emphysematous pyelonephritis (EPN) is a serious kidney infection associated with very high rates of renal loss and mortality [1]. EPN is an acute necrotizing infection of the renal parenchyma and surrounding tissues and which can result in the formation of gas within the renal parenchyma, the collecting system, the perinephric tissues, and rarely the spermatic cord, and the scrotum [2]. It occurs almost exclusively in patients with diabetes mellitus (DM), but sometimes in patients without DM along with obstruction of the corresponding Reno ureteral unit can also cause this condition. It is different from “emphysematous pyelitis” which represents the presence of gas only within the collecting system and which is caused usually by iatrogenic interventions, reflux of gas from the urinary bladder, or fistulas [3]. Many other risk factors are urinary tract

obstruction, drug overuse, neurogenic bladder, alcoholism, and anatomic deformities of the urinary system [4]. Many studies had concluded that vigorous resuscitation and appropriate medical treatment should be attempted [5], but immediate nephrectomy should not be delayed for successful management of EPN.

Case Report

A 69 years old female known as diabetic on insulin, a history of pancreatic Neoplasm operated on one year before presented in ED with complaints of fever, nausea, and vomiting for 2 days history. she was unable to tolerate oral liquid and didn't take insulin. She has complained of left flank pain and decreased urine output. The patient was shifted to the radiology department for a CT abdomen, which revealed gas in the collecting system of the left kidney, left ureter, and

Urinary Bladder with mild hydronephrosis and dilated ureter. She started empirical antibiotic Piperacillin-tazobactam with IV fluid replacement as she was looking dehydrated. She has some tenderness in the left Renal angle. The patient became hypotensive slowly even after IV fluid replacement, so Inotropic support was started and the patient was shifted under the care of the ICU. Consulted urology and was advised to keep her NPO. She was posted for DJ stenting for the next day. After shifting to ICU, the patient became unresponsive, so intubation was done and the trachea was secured. Urgent DJ stenting was done [6]. She was in septic shock. Blood gas was showing metabolic acidosis. Resuscitation was done with IV fluid and inotropic support. The Antibiotic was escalated. A large amount of thick pus was out during the procedure. Lab reports showed an increase in WBC count, thrombocytopenia, and high PT/PTT. Infective markers like Procalcitonin were more than 100. Liver function tests were also deranged. She was diagnosed with acute pyelonephritis with sepsis and uncontrolled hyperglycemia. She was started empirically on meropenem and vancomycin injection and placed on intravenous fluids and an insulin infusion pump. After 3 days of mechanical ventilation, sedation was weaned off slowly. She was extubated after 5 days successfully. She was slightly disoriented for 3 days after extubating but later recovered fully.

Discussion

EP is a uniformly fatal illness if not treated properly. Patients who are treated medically have a higher mortality rate than those treated surgically, 70% vs. 30%. The causative pathogen of EP is usually *E. Coli* (70%), *Proteus mirabilis*, *Klebsiella pneumoniae*, *Streptococcus Group D*, *Staphylococcus coagulase (-)*, and more rarely anaerobes like *Clostridium septicum*, *Candida albicans*. In our case, we found *Candida albicans*. Factors that are related to high mortality are systolic blood pressure <90 mmHg, altered mental status, increase in serum creatinine, thrombocytopenia, bilateral disease, and the treatment of disease only with antibiotics. Clinical manifestations are similar to patients presenting with acute pyelonephritis but usually, they are not responding to medical treatment. Confirmation of the diagnosis is by radiologic study. A plain X-ray abdomen can be more specific than sonography in detecting air in the renal collecting system. but both have some limitations because of the superimposition of gas from the bowel or retroperitoneum. CT abdomen is a more specific and sensitive tool and has been recommended as the most useful diagnostic modality in these cases [7].

In 1970, Langston and Pfister²² described 3 main radiographic patterns and postulated that they were correlated with the stage of the disease. They were diffuse mottling of the renal parenchyma, bubbly renal parenchyma

surrounded by a crescent of gas (perinephric space), and extension through Gerota's fascia (ie, pararenal space) [8]. In a meta-analysis of seven cohort studies, including 175 patients, risk factors for mortality were analyzed. The overall mortality rate was 25 % (ranging from 11%-42%). The differential diagnosis of EP includes renal abscess, iatrogenic presence of gas, posttraumatic infarction, and hollow organ perforation. Treatment includes general support with oxygen, intravenous fluid administration, correction of the acid-base balance, glucose control, and antibiotics. Antibiotics must be chosen by culture sensitivity. Before the advent of interventional radiology, early surgery and nephrectomy were mandatory procedures.

This case here demonstrates multiple risk factors associated with high mortality if we go with medical management, these factors include high serum creatinine, thrombocytopenia, high liver function tests, etc.

When is the Proper Time to Do an Ultrasound?

Abdominal pain is a common presenting complaint in the emergency department. In the case of this patient with vague abdominal symptoms, without obvious urinary symptoms.

Conclusion

Usually, *E. Coli* or *K. pneumoniae* infection in patients with DM and/or urinary tract obstruction is the cornerstone for the development of EPN. In patients with DM, the high level of blood glucose may provide gas-forming microorganisms with a more favorable environment for gas formation. For localized EPN, relief of the urinary tract obstruction (if it exists) combined with antibiotic treatment can provide a good outcome [9]. For extensive EPN with a more benign manifestation (ie, <2 risk factors), percutaneous catheter drainage combined with antibiotic treatment may be attempted due to its high success rate. EPN is a rare infection with a high mortality rate if not approached aggressively. POCUS is an excellent option that can be performed rapidly at the bedside, and for many cases of abdominal pathology including small bowel obstruction, cholecystitis, appendicitis, and obstructive renal processes may either inform the decision to proceed with CT or bypass it altogether. When we are in doubt, pick up the ultrasound probe, and do a simple FAST exam along with a survey of the kidneys and bowel, it can indicate some intra-abdominal sources of sepsis along with free fluid, dilation of the bowel, and more.

Conflict of Interest

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