International Journal of Advances in Medicine
Manappallil RG et al. Int J Adv Med. 2017 Oct;4(5):1487-1489
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933
DOI: http://dx.doi.org/10.18203/2349-3933.ijam20174309

Case Report

Emphysematous pyelonephritis presenting in acute respiratory distress syndrome: a case report

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Received: 30 July 2017
Accepted: 27 August 2017

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ABSTRACT

Emphysematous pyelonephritis is a life-threatening infection of the kidneys characterized by acute necrosis with associated gas formation involving the renal parenchyma and perinephric tissues. It is a rare condition and occurs mostly in diabetic females, carrying a high mortality rate. The management involves antibiotics and surgical interventions. This is a case of an elderly lady, diabetic, who had fever and burning micturition and was initially treated with oral antibiotics. She later presented with fever, dyspnoea and dysuria, and was diagnosed to have emphysematous pyelonephritis with acute respiratory distress syndrome. She was successfully managed with broad spectrum antibiotics and percutaneous nephrostomy. As emphysematous pyelonephritis requires both medical and surgical interventions, this case, therefore, highlights the importance of its early detection, as it can be life-saving.

Keywords: Acute respiratory distress syndrome, Dysuria, Diabetes mellitus, Emphysematous pyelonephritis

INTRODUCTION

Pyelonephritis is defined as symptomatic infection of the kidneys. While mild pyelonephritis may present as low-grade fever with or without loin pain, severe cases can manifest with high grade fever, nausea and vomiting and loin pain. Emphysematous pyelonephritis (EPN) is a more severe form of pyelonephritis, and is characterized by acute necrosis and gas formation in the renal and perirenal tissues.[1] The condition was first described by Kelly and MacCullum in the year 1898.[2] It is more common among diabetes; with higher incidence among females.[1] Broad spectrum antibiotics along with immediate urological interventions like percutaneous drainage and nephrectomy forms the mainstay of the treatment.[3-5]

CASE REPORT

A 60-year-old female presented to the Emergency department with history of fever and dysuria for 8 days, for which she was treated by a local doctor with oral Ciprofloxacin for 5 days. However, patient continued to be febrile. She also gave history of dyspnoea and dry cough for past 2 days. She is a diabetic on insulin therapy.

On examination, she was conscious, oriented but restless, and febrile (temperature of 102°F). Her systolic blood

pressure was 80 mmHg (diastolic was not recordable), pulse 130/minute, respiratory rate 38/minute with saturation of 85% (in room air). Her systemic examinations revealed bilateral lung crepitation's and mild suprapubic tenderness. She was intubated and put on mechanical ventilation. Adequate intravenous fluid resuscitation was given along with non-adrenaline infusion. She was catheterized and her urine was blood tinged. Features suggestive of acute respiratory distress syndrome (ARDS) were seen on her chest X-ray (Figure 1). Ultrasound sound abdomen revealed an ill-defined, hypoechoic area in the upper pole of left kidney with streaks of air and a thin rim of perinephric fluid, suggestive of EPN. Her blood investigations showed leucocytosis (22,300 cells/ cumm) with neutrophilia (N94 L6), deranged renal functions (urea 72 mg/dL and creatinine 2.8 mg/dL) and elevated liver enzymes (SGOT 89 and SGPT 102). Her electrolytes, PT/INR and activated partial thromboplastin time were normal. ECG showed sinus tachycardia. There were plenty of pus cells on urine microscopy. Her HbA1c was 10.2% and sugar levels were controlled with short and long acting insulins. CT abdomen (taken after stabilizing the patient) confirmed the diagnosis of EPN as Class 2 (Figure 2).

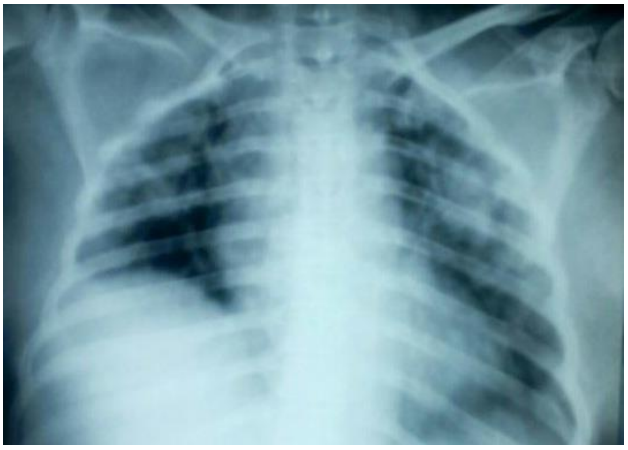

Figure 1: Chest X-ray showing ARDS.

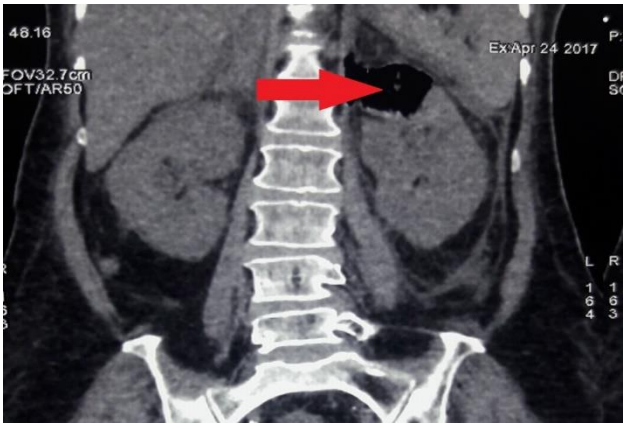

Figure 2: CT abdomen (coronal view) showing air in the upper pole of left kidney with thin rim of perinephric fluid.

She was started on intravenous Piperacillin-Tazobactum and percutaneous nephrostomy was done. Her urine culture grew Klebsiella (which was sensitive to Piperacillin-Tazobactum) and blood culture was sterile. By day 4 of admission, patient started improving with normalisation of vitals and blood parameters. She was extubated; antibiotics were continued (total 10 days) and nephrostomy tube was removed on day 14. She was discharged in stable condition on day 16 of admission.

DISCUSSION

EPN is a rare life threatening acute necrotizing infection with subsequent gas formation involving the renal parenchyma and perirenal tissues. The condition commonly involves the left kidney, but bilateral renal involvement has been seen among 5% of the cases.[6] Escherichia coli, Klebsiella pneumoniae and Proteus are the common aetiological pathogens. EPN due to Pseudomonas, Enterobacter, Candida and Citrobacter freundii have also been reported.[7-9] High levels of glucose in the vicinity of the renal tissue and impaired tissue perfusion serve as predisposing factors.[10,11] These organisms ferment sugars within the urine, thereby, producing gases like nitrogen, oxygen, hydrogen and carbon dioxide.[7] Ultrasonography and computerized tomography of the abdomen are the main diagnostic modalities, with 80% and 100% sensitivity respectively.[12,13] EPN can be classified into different classes based on the CT findings.

- Class 1: Gas confined to the collecting system alone
- Class 2: Gas confined to renal parenchyma alone
- Class 3a: Gas or abscess extending into the perinephric region; 3b: Gas extending beyond the Gerota fascia
- Class 4: Bilateral EPN or unilateral EPN with a solitary kidney.[3]

This classification is important in the management of EPN, i.e.

- Class 1 and 2: antibiotic treatment combined with CT-guided percutaneous drainage
- Class 3 and 4 (extensive EPN without signs of organ dysfunction): antibiotic therapy combined with percutaneous catheter placement
- Class 3 and 4 (extensive EPN with signs of organ dysfunction): nephrectomy.[3-5]

Our patient had class 2 EPN and was treated with broad spectrum antibiotics and percutaneous nephrostomy.

CONCLUSION

EPN is a rare condition carrying a high mortality. The condition should be suspected in diabetic patients presenting with urinary tract infection, especially in females. Since the management involves both antibiotics and urological interventions, an early diagnosis is very

essential. Our patient is an elderly diabetic female who had fever and burning micturition, and was initially treated with oral antibiotics. Later she developed EPN and presented in ARDS; and was successfully managed with broad spectrum antibiotics and percutaneous nephrostomy, along with other supportive measures like mechanical ventilation, inotropic support and fluid resuscitation.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Manappallil RG, Azeez A, Kumar A, Prasad G, Sabir MC. Emphysematous pyelonephritis presenting in acute respiratory distress syndrome: a case report. Int J Adv Med 2017;4:1487-9.