Abstract:
Emphysematous Pyelonephritis EPN is a rare life threatening necrotizing infection of the renal parenchyma and perinephric tissue. EPN is characterized by gas formation in the renal parenchyma and its surrounding structures. The predisposing factors are diabetes mellitus and ureteric obstruction. Infections especially urinary tract infections are major predisposing factors for Diabetic Keto-Acidosis DKA. We are presenting a case of Emphysematous Pyelonephritis in a diabetic patient who presented with DKA.

Keyword: Diabetic ketoacidosis DKA Emphysematous Pyelonephritis EPN Urinary tract

A 55 year female patient presented with complaints of Fever of 1 week duration. Fever was high grade, intermittent and was associated with chills and rigors. She was also having breathlessness from 2 days prior to the presentation. Past history revealed that she was hypertensive and diabetic since 18 years, there were prior admissions with similar complaints, was diagnosed and treated for Diabetic ketoacidosis. On examination she was conscious, oriented, pale, febrile, and tachypneic, dehydrated and was having bilateral pitting pedal edema. Vitals showed tachycardia (118 beats/min), systolic blood pressure 130 mm of mercury Systemic examination revealed bilateral wheeze, basal crepitations and tenderness over the left loin. Investigations showed reduced hemoglobin (8gm/dL, normal 14-15gm/dL), elevated total count TC (19600/mm³, normal 4000-11,000/mm³) with polymorph predominance (90%). She had high blood glucose and poorly glycemic control in past 6 months (HbA1c- 9.0 gm %, good control <6.5 gm %). Her Renal function tests and Liver function tests were normal. Urine analysis showed urine was positive for ketone bodies and active deposits (18 to 20 pus cells per High power field HPF). Arterial Blood Gas analysis showed High Anion gap metabolic acidosis with inadequate respiratory compensation. She was diagnosed with Diabetic ketoacidosis and Possible Sepsis. Blood and urine cultures were taken and patient was treated with empirical antibiotics. DKA treated with Intravenous IV infusion of Human insulin, fluid resuscitation with IV normal saline...
and potassium supplementation. Ultrasonogram abdomen and pelvis revealed fatty liver, mild splenomegaly and hyper-echoic lesion in the lower pole of left kidney.

Contrast Enhanced Computed Tomography CECT abdomen and pelvis revealed hypo-dense lesion in the lower pole of left kidney (Star, Figure 1, A), with air pockets (white arrows, Figure 1,B and C) visible within the lesion and in the perinephric tissues. Lesion was seen extending beyond the Gerota’s fascia (black arrow, Figure 1, B), with perinephric fat stranding. Both Blood culture and urine culture showed E.coli growth (Colony form units CFU $10^5$ in urine cultures). She was finally diagnosed with Sepsis; Emphysematous Pyelonephritis Class 3 B and Diabetic ketoacidosis. She was treated with percutaneous drainage of perinephric necrotic material under Ultrasonogram guidance and with appropriate antibiotics and Glycemic control with Intravenous infusions of Human Insulin. She made an uneventful recovery with the above management and was discharged with instructions to continue Sub-cutaneous Insulin injections for Glycemic control.

**DISCUSSION:** Emphysematous Pyelonephritis is a severe necrotizing infection of the renal parenchyma with gas formation within the collecting system, renal parenchyma and/or per renal tissues, seen usually in diabetic patients. The first case of pneumaturia was reported in 1898; since then approximately 200 cases have been reported. The condition is life threatening with mortality up to 40% being reported in some centers in the west. Gas in the renal parenchyma is also seen in xanthogranulomatous Pyelonephritis, but not to the extent of EPN. E. coli is isolated in 66% of patients, klebsiella in 26% and organisms like Proteus, pseudomonas, streptococcus, rarely candida and clostridium are also seen. Recently entamoeba histolytica, aspergillus have also been reported. Mixed organism seen in 10% of cases. The infection has a fulminating course and can be fatal. The factors that predispose are uncontrolled diabetes, high levels of glycosylated hemoglobin, impaired host immunity. The gas is composed of N (60%) H2 (15%) CO2 (5%) O2 (8%). It has been concluded that mixed acid fermentation is responsible for gas production. The mean age of presentation is 55yrs, six times more common in females. Left kidney is more commonly affected. Usually seen in diabetics (upto 95%). Obstruction is the main cause of EPN in non-diabetics Staging of renal parenchymal gas is made radiologically, and might be useful for decision making and prognosis. Michaeli et al. suggested a modification of Langston et al earlier classification on the basis of abdominal X-ray and an intravenous pyelography. Wan et al. classified the gas collection as type I or type II) on the basis of CT scans. Mortality was 69% in patients with type I EPN and only 18% in patients with type II EPN. Chen et al. showed the same mortality rates for type I and type II EPN. Huang and Tseng also used CT to classify patients with EPN. Their class I and II patients all survived following treatment with percutaneous procedures and medical therapy. In patients with class III or IV gas patterns, those with fewer than two risk factors had an 85% survival rate with percutaneous drainage and medical therapy, whereas patients with class III or IV patterns with two or more risk factors had a 92%
failure rate with percutaneous drainage and medical therapy. The system of Huang and Tseng seems an appropriate classification, as it suggests a management protocol for each disease class.

Classification of EPN by Huang and Tseng (based on CT)
Class I: Gas in collecting system only
Class II: Parenchymal gas only
Class IIIa: Extension of gas into perinephric space
Class IIIb: Extension of gas into pararenal space
Class IV: EPN in both kidneys or EPN in solitary kidney

CONCLUSIONS:
Patients with DKA usually have poor glycemic control in weeks to months prior to their presentation. It is necessary to rule out all the potential precipitating causes for DKA during the management of the disease. Also the essential part of management is patient education regarding potential complications of mismanaged glycemic status. Management of EPN should be multidisciplinary involving medical as well surgical treatment. In recent times the presentation of EPN is changed. It is uncommon to identify extensive Perinephric and subcutaneous emphysematous infection, EPN is diagnosed with identification of limited pockets of gas in parenchymal tissue on CT abdomen. So a conservative approach is needed in management of EPN and percutaneous drainage, rather than nephrectomy, should be the standard of care for the majority of patients. We treated this patient through percutaneous drainage of Perinephric necrotic material under ultrasonogram guidance and appropriate antibiotics as suggested by culture and sensitivity reports, throughout maintaining adequate glycemic control and fluid resuscitation. We propose that nephrectomy should only be considered when effective medical management and percutaneous drainage do not contain the infection.

REFERENCES: