Emphysematous Pyelonephritis
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Section: Uroradiology & genital male imaging
Imaging Technique: CT
Case Type: Clinical Cases
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Patient: 32 years, female

Clinical History:

Known with diabetes was admitted to the hospital with chills fever and progressive abdominal pain. Clinical and laboratory examinations revealed a dehydrated subconscious patient with hyperglycemia, ketoacidosis and E. coli septicaemia.

Imaging Findings:

A patient known with diabetes was admitted to the hospital with chills fever and progressive abdominal pain. Clinical and laboratory examinations revealed a dehydrated subconscious patient with hyperglycemia, ketoacidosis and E. coli septicaemia.

Plain radiograph of the left hemi-abdomen shows air bubbles in a radial, streaky configuration within the upper pole of the left kidney.

Native CT scan of the left kidney demonstrates extensive intrarenal gas, distributed predominantly in the cortical region of the kidney. Linear low-density areas within the renal parenchyma and thickening of the renal fascia and enlargement of the posterior perinephric space are seen.

Macroscopy of the resected kidney shows multiple subcapsular and cortical abscesses in the upper and middle pole of the kidney.

Microscopy of the left kidney shows severe hyalinisation of renal capillaries in the non-affected renal parenchyma. Air in the left kidney, seen on plain radiograph and CT scan, was virtually pathognomonic for emphysematous pyelonephritis. The diagnosis was confirmed pathohistologically and left nephrectomy was performed. The postoperative course was uneventful. Patient recovered completely and was discharged from the hospital in good condition.

Discussion:

Emphysematous pyelonephritis (EPN) is a relatively uncommon lifethreatening bacterial infection characterized by gas formation within the renal parenchyma or the perinephric space. Because of its associated high mortality in diabetic patients, EPN is clearly the most important subtype of acute renal infection. EPN should clearly be distinguished from emphysematous pyelitis, ureteritis, and cystitis, in which the gas collections are confined to the lumina and where clinical presentation, treatment, and outcome are similar to that of pyohydronephrosis. Most patients with EPN are diabetics, 90% with mean age of 55 years. There are no reported pediatric cases. The 2:1 female to male ratio reflects the overall higher incidence of urinary tract infections in women. Only 20% of diabetics with EPN have coexistent urinary obstruction compared with 75% of non-diabetics. Bilateral involvement occurs in 5 to 10% and both native and transplant kidneys may be affected.

Typically, the gas formation is associated with necrotizing inflammation and multiple small parenchymal abscesses. The infection may transgress the renal capsule to involve the perinephric fat and pararenal spaces. The usual pathogen is E. coli (62%), with other organisms, such as Klebsiella, Pseudomonas, Proteus, Aerobacter, and
Candida being occasionally involved. The formation of gas in EPN results from fermentation of high tissue-glucose levels in hypoxic and necrotic tissues.

As with other complicated infections, the clinical presentation is usually acute with chills, fever, flank pain, lethargy, confusion, nausea, vomiting, dysuria, septic shock and coma. Other patients present with a more chronic and indolent urinary tract infection, associated with pyuria, leukocytosis, glycosuria, hyperglycemia, and in 65% of cases azotemia.

CT scan is most valuable for accurate diagnosis of EPN. A diffuse mottling of small air bubbles in the kidney, linear streaks of air extending from medulla to outer cortex, and crescentic gas, either subcapsular or within the perinephric space or the retroperitoneum, are the gas patterns encountered in EPN.

**Differential Diagnosis List:** Emphysematous pyelonephritis

**Final Diagnosis:** Emphysematous pyelonephritis

**References:**


Figure 1

Description: shows air bubbles in a radial, streaky configuration within the upper pole of the left kidney.

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Description: Macroscopy of the resected kidney shows multiple subcapsular and cortical abscesses in the upper and middle pole of the kidney. Origin:
Description: shows severe hyalinisation of renal capillaries in the non-affected renal parenchyma. Air in the left kidney, seen on plain radiograph and CT scan, was virtually pathognomonic for emphysematous pyelonephritis. The diagnosis was confirmed pathohistologically and left nephrectomy was performed. The postoperative course was uneventful. Patient recovered completely and was discharged from the hospital in good condition.

Origin: