Urology Case Reports 38 (2021) 101685

Contents lists available at ScienceDirect

Urology Case Reports

journal homepage: www.elsevier.com/locate/eucr

Inflammation and infection

A rare case of emphysematous pyelonephritis associated with pneumatosis intestinalis and bowel ischemia

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ARTICLE INFO

Keywords:
Emphysematous pyelonephritis
Kidney
Urinary tract infection
Renal abscess

ABSTRACT

Emphysematous pyelonephritis (EPN) is a rare life-threatening gas producing kidney infection, commonly affects uncontrolled diabetic patients with underlying urinary tract obstruction. Presence of pneumoperitoneum and involvement of the bowels are uncommon presentation of EPN. In the present report, we present a 59-year-old African male who had extensive EPN with pneumoperitoneum, pneumatosis intestinalis and extension to the bowel causing ischemia. Successful surgical exploration was done, with resection anastomosis of the ischemic bowel segment and drainage of the kidney.

Introduction

Kelly and MacCallum first discovered emphysematous pyelonephritis (EPN) in 1898, which is a rare acute necrotizing parenchymal and peri-renal infection triggered by gas-forming uropathogens.[1] Before Schultz and Klorfein invented the word emphysematous pyelonephritis "i.e., acute renal inflammation correlated with gas formation" in 1962, different words were used to characterize this condition, such as renal emphysema and emphysematous pyelonephritis.[2] The most famous causative organism is *E. coli*. Patients with untreated diabetes mellitus (DM) are more likely to have an intrinsic risk factor for infection development, such as a ureteric stone or ureteric stricture.[3] To assess the degree of EPN infection and to direct the management strategy, computerized tomography (CT) is the imaging technique of choice. EPN is correlated with a high likelihood of morbidity, with an average mortality rate of up to 43%. Since most EPN patients are seriously ill, appropriate parenteral antibiotics and fluid resuscitation are needed. Surgical intervention has progressed from vigorous surgical experimentation to prudent treatment, with percutaneous draining or D-J stenting used to remove the obstructed kidney. While several studies have shown that surgical treatment paired with obstruction relief improves renal function, many patients do need nephrectomy.[4]

Pneumoperitoneum is characterized as the presence of air or gas in the abdominal (peritoneal) cavity, while pneumatosis intestinalis (PI) is defined as the presence of gas in the bowel wall and is identified radiologically using abdominal radiographs or CT scans.[5] EPN in the presence of pneumoperitoneum[2] and PI[5] is an unusual clinical case. Owing to the rarity, we are disclosing this case of EPN, pneumoperitoneum, and bowel ischemia in a patient who has no previous medical history of DM or urinary tract obstruction. Antibiotics, open draining, resection of the ischemic colon, and diversion were both effective treatments for the patient.

Case presentation

We report a 59-year-old African male with a history of hypertension who came to the emergency room with a one-week pattern of left flank & iliac pain that began abruptly and intensified over time, radiated to the back, and was accompanied by nausea, fatigue, dysuria, and a fever of 39° Celsius. During admission, the patient was awake, concentrated, and seemed to be sick. The refractory temperature, blood pressure, and pulse were both 160/100, 115/min, and 22/min, respectively. The left costovertebral angle was tender, the left iliac was tender, the bladder was not palpable, and the patient was willing to void. A white blood cell

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https://doi.org/10.1016/j.eucr.2021.101685
Received 6 April 2021; Accepted 15 April 2021
Available online 27 April 2021

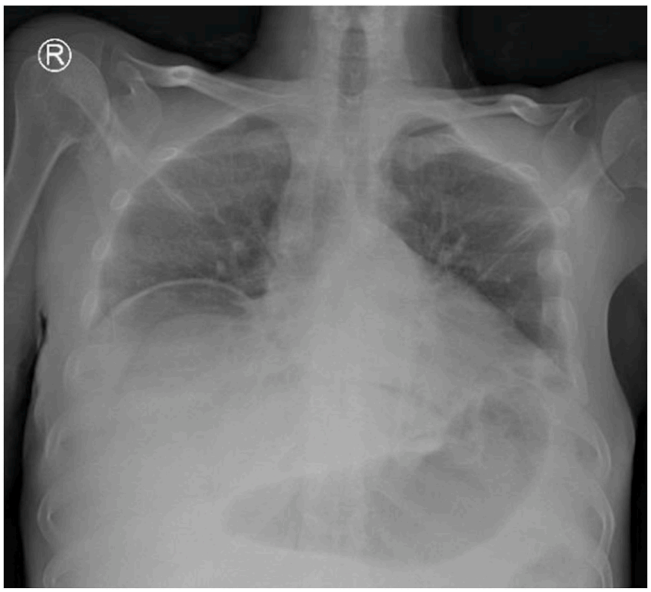

Fig. 1. Chest-X-ray showing air under diaphragm.

count (WBC) of 15.50/mm3, hemoglobin of 11.3 g/dl, platelet count of 173000/mm3, and serum creatinine of 2.18 mg/dL were discovered in a laboratory examination.

The patient started on empirical antibiotics and IV fluid hydration as soon as he was admitted. He began to deteriorate steadily during the next few hours and became hemodynamically unstable. Air under the diaphragm, as seen on a Chest X-ray (Fig. 1). A CT scan without contrast showed an edematous, bulky left kidney with significant air inside, as well as perinephric pneumatosis and fluid accumulation. In the descending colon's mesentery, there was a significant inflammatory change, pneumatosis and fat stranding (Fig. 2 A, B). CT with oral and intravenous contrast showed re-demonstration of left perinephric air and fluid collection, small to medium pneumoperitoneum, normal bowel loops (Fig. 3).

The Gerona fascia was opened and the perinephric abscess was drained during an open laparotomy. General surgery team involved in the operation room, they discovered approximately 10 cm of the descending colon was ischemic and inflamed and attempted resection with anastomosis and stoma formation (Hartmann's procedure). The patient's condition changed dramatically after surgery. Klebsiella pneumonia was identified as the microorganism in the blood and urine samples, and it was susceptible to the antibiotic's ceftriaxone and vancomycin. The patient's postoperative phase was uneventful, and his complications disappeared entirely during his hospitalization.

Discussion

While the actual pathogenesis of EPN remains unknown, numerous reports have attributed the disease's development to elevated glucose tissue concentrations, reduced tissue perfusion, and insufficient or ineffective immune responses.[1] Patients with diabetes mellitus (70-90%) or urinary tract restriction are the most commonly affected.[3] Women are much more prone to being harmed than males. The

Fig. 3. Axial section of abdominal CT with intravenous and oral contrast showed re-demonstration of left perinephric air and fluid collection and there was normal bowel loops.

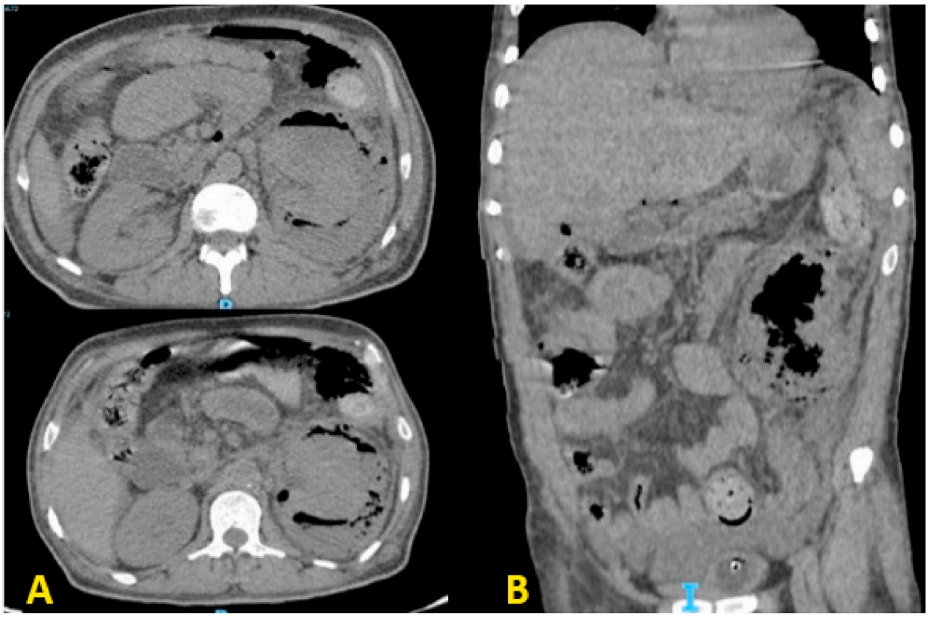

Fig. 2. A: CT abdomen axial section without contrast: showed pneumoperitoneum and edematous bulky left kidney with significant air inside, and perinephric pneumatosis with fluid collection.
B: Coronal section of abdominal CT without contrast showed significant inflammatory change, pneumatosis and fat stranding in the mesentery of descending colon.

pathogen *E. coli* is the most well-known, preceded by *Klebsiella pneumoniae* and *Proteus mirabilis*.[4]

Emphysematous pyelonephritis is difficult to identify since there are no pathognomonic signs or symptoms.[1] The expanded usage of abdominal ultrasound and CT scan in patients with symptoms and signs of sepsis or complex urinary tract infections has resulted in the diagnosis and documentation of the majority of cases of emphysematous pyelonephritis.[3] Because of the rarity of events and the absence of well-designed randomized clinical trials, optimal treatment solutions remain ill-defined and controversial. While nephrectomy and open drainage were once deemed first-line therapies, they are still only used where medical management has collapsed. The mainstays of therapy are antibiotics, percutaneous abscess drainage, fluid resuscitation, and strict glucose control.[1] The mortality rate after antibiotic therapy is 60–75%, and after antibiotic therapy and nephrectomy, it is 21–29%. The mortality rate rises to 80% when the disease progresses into the perinephric space, with an estimated death rate of 43%.[4]

The occurrence of extraluminal bowel gas confined within the mucosal and submucosal layers of the antimesenteric boundary is known as PI, and it may be correlated with extreme underlying conditions such as necrotizing enterocolitis and bowel ischemia.[5] The occurrence of bowel ischemia on the descending colon section during surgical exploration may be explained by this. The combination of EPN and PI signifies the magnitude of the underlying pathological disorder, involving an immediate surgical exploration with kidney drainage and resection-anastomosis of the ischemic bowel with stoma formation (Hartmann's procedure).

Conclusion

EPN is a potentially fatal infection. In extreme cases, infection may spread to nearby tissues, inducing pneumoperitoneum, PI, and even bowel ischemia, which necessitates urgent surgical intervention.

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