Emphysematous pyelonephritis with infected abdominal aorta pseudoaneurysm among a diabetic man

Wiem Feki[1], Fatma Hammami[2], Amina Kammoun[1], Makram Koubaa[2], Mounir Ben Jemaa[2], Zaineb Mnif[1]

1. *Radiology Department, Hedi Chaker University Hospital, University of Sfax, Tunisia*
2. *Infectious Diseases Department, Hedi Chaker University Hospital, University of Sfax, Tunisia*

Corresponding author: *Fatma Hammami, MD*
Infectious Diseases Department, Hedi Chaker University Hospital, University of Sfax, Tunisia
Phone: +216-51-755-665
E-mail : fatma.hammami@medecinesfax.org

Abstract

Background: Emphysematous pyelonephritis (EPN) is an acute necrotizing infection of the kidney that generates gas within the renal parenchyma/collecting system, or perinephric space. It requires aggressive medical management, often involving surgery. To our knowledge, its association with an infected abdominal aorta pseudoaneurysm has never been documented. We report the case of a diabetic patient with concomitant infected abdominal aortic pseudoaneurysm with EPN.

Case Report: A 63-year-old man with a history of uncontrolled diabetes mellitus type 2 presented with a fever, abdominal pain, dysuria, and malaise. Physical examination revealed signs of moderate shock. Ultrasound showed the absence of the left kidney, which is replaced by a structure containing several echogenic foci mimicking left colic flexure and a normal-sized right kidney. An urgent computed tomography (CT) scan revealed the presence of air as of the scout CT image, then confirmed during the CT scan by demonstrating intraparenchymal, perinephric, and pararenal air, consistent with EPN. In addition, it showed the presence of voluminous pseudoaneurysm arising from the left lateral wall of the abdominal aorta, with alteration of the left renal artery. Emergent nephrectomy and open repair of the large pseudo-aneurysm were strongly considered. In the operating room, upon initiating anesthesia, a cardiopulmonary arrest has occurred. Despite the resuscitation, the patient passed away.

Conclusion: Our case highlights a rare and fatal association between EPN and an infected abdominal aortic pseudoaneurysm. Early recognition and prompt imaging are essential in diabetic patients presenting with signs of sepsis and abdominal symptoms. The coexistence of these two severe infections presents significant diagnostic and therapeutic challenges, emphasizing the need for rapid multidisciplinary intervention to improve outcomes.

Keywords: Aorta, Pseudoaneurysm, Emphysematous pyelonephritis, Diabetes mellitus

Introduction

Emphysematous pyelonephritis (EPN) is an uncommon and highly fatal condition (1, 2). It is an acute necrotizing infection of the kidney that generates gas within the renal parenchyma/collecting system, or perinephric. It requires aggressive medical and often surgical management. To our knowledge, its association with an infected abdominal aorta pseudoaneurysm has until now never been documented. The mechanism of pseudoaneurysm formation is thought to be related to infected emboli, bacteriemia, and contiguous infection. We report the case of a diabetic patient with concomitant infected abdominal aortic pseudoaneurysm with EPN.

Case presentation

A 63-year-old man with a history of uncontrolled type 2 diabetes mellitus has presented with a fever, abdominal pain, dysuria, and malaise, which had increased in severity over the last 2 days. He was a great smoker and had an ancient travel history. On admission, he was febrile (38.5°C). Physical examination found early signs of shock: pallor, mottled skin, tachycardia, and decreased systolic blood pressure of 90 mmHg. His white blood cell count was elevated at 28000/mm^3. C-reactive protein level was 340 mg/L. Ultrasound didn't find the left kidney, which was replaced by a structure containing several echogenic foci mimicking left colic flexure and a normal-sized right kidney. There was no evidence of urinary tract obstruction.

An urgent computed tomography (CT) scan revealed the presence of air, as shown on the scout CT image (Figure **1**)

Figure 1: Scout computed tomography image shows air in the projection of the left renal space, suggestive of emphysematous pyelonephritis with extension to pre-vertebral space. It seems to surround a pre- and latero-vertebral structure.

and confirmed the diagnosis of EPN by showing intraparenchymal, perinephric, and pararenal air (**Figures 2, 3**).

In addition, it showed the presence of voluminous pseudoaneurysm (**Figures 2, 3**) arising from the left lateral wall of the abdominal aorta, with alteration of the left renal artery. Air was also present in peri-aortic spaces and surrounding the pseudoaneurysm. There was no drainable abscess or obstructive uropathy. No signs of active bleeding were present during the CT scan.

Initial treatment consisted of urgent fluid resuscitation, control of diabetes with insulin, and antibiotics. The patient was hemodynamically stabilized, but he continued to have severe, progressive abdominal pain. Urgent

nephrectomy and open repair of the large pseudo-aneurysm were strongly considered. In the operating room, after initiating anesthesia, a cardiopulmonary arrest has occurred. Despite the resuscitation, the outcome was fatal.

Figure 2: Axial enhanced abdominal computed tomography scan (A, B) shows free and extensive air in the left renal bed (asterisk), retroperitoneum, pararenal, peri-aortic spaces, and surrounding the voluminous pseudoaneurysm associated with fatty infiltration (arrow). Axial thin maximum intensity projection (MIP) computed tomography image (C) illustrating vascular alteration by showing the absence of left renal artery visualization

DISCUSSION

EPN is a rare disease defined by the acute necrosis and presence of gas within the renal parenchyma, collecting system, or perirenal tissue (1, 2). Many factors for the development of EPN are intricate and suggested to be uncontrolled tissue glucose level, favoring bacterial growth, renal tissue ischemia and necrosis secondary to compromised renal perfusion, immunodeficiency, and diabetes (3). In our case, the development of abdominal aorta pseudoaneurysm affecting the left renal artery origin has decreased arterial flow to the left kidney. Therefore, a vicious circle has been installed. Indeed, pseudoaneurysm participated in association with diabetes and prolonged sepsis in EPN development, and EPN, in its turn, as a contiguous infection, enhanced pseudoaneurysm formation. This association between pseudoaneurysm and EPN is an exceptional clinical entity, and to our knowledge, it has until now never been documented.

Numerous clinical presentations have been described for EPN, but the most common features are the classic signs of urinary tract infections, or due to other complications such as thrombocytopenia, neurological disturbances, and shock. However, none of these findings help to differentiate EPN from other diseases, demonstrating the importance of early imaging investigation.

The diagnosis of EPN may be suggested by the presence of gas in the renal area on plain X-ray. Also, ultrasound is not sensitive enough to diagnose the presence of gas in the kidney.

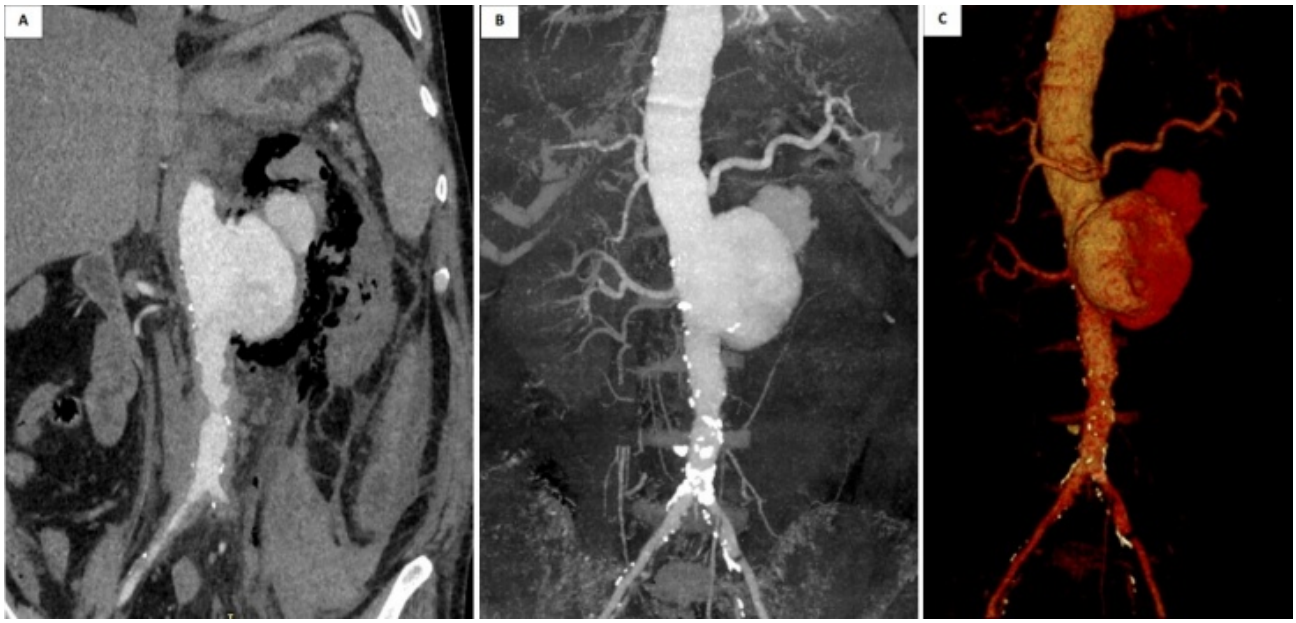

Figure 3: Coronal reconstruction of enhanced abdominal computed tomography scan (A) shows a free gas collection outlining the pseudoaneurysm. There are calcified plaques in the aorta with an irregular fringe. Coronal thin maximum intensity projection (MIP) computed tomography images (B) and volume rendered images (VRT) (C) showing saccular shape of the pseudo-aneurysm, partially calcified aortic wall, and a normal right renal artery

Detection of renal parenchymal gas on ultrasound requires a high index of suspicion. Gas appears as echogenic foci with "dirty"

shadowing in the non-dependent position. The appearance can change with the position of the patient. The initial ultrasound in our patient showed the absence of the affected kidney because of air (gassed-out kidney).

The CT scan picked up the emphysematous destruction of the kidney. It not only confirms the diagnosis but can also show the extent of the disease. The Huang classification system, based on CT findings of gas collection, is described as the most useful diagnostic and prognostic factor for EPN (4). Class 1 involves gas in the

collecting system only; Class 2 involves parenchymal gas only; Class 3 involves the extension of gas into the perinephric (3a) or

pararenal (3b) spaces; and Class 4 occurs in

patients with a solitary kidney or those presenting with bilateral disease. In our patient with class IIIb EPN, mortality rates of up to 50% have been reported even after early nephrectomy.

In our case, CT was not only useful for EPN but also to make an incidental diagnosis of abdominal aorta pseudoaneurysm, which is a serious and life-threatening disease. As a result, the therapeutic conduct can be affected.

Management of EPN is multidimensional, initially requiring vigorous resuscitation, fluid and electrolyte replacement, glucose control, and antibiotic treatment. Traditionally, radical nephrectomy was the primary approach to EPN. In recent studies, conservative management is as effective as nephrectomy (5). However, it is prudent to consider surgical intervention if a

patient presents with severe disease, as in our case. Our patient had an additional imminent and infected aorta pseudoaneurysm requiring open surgery. Traditionally, pseudoaneurysm treatment has been surgery, but in recent years, minimally invasive interventions, including percutaneous, transcatheter management, and endovascular stent grafts, have been developed as alternatives to surgery. In our case, the decision to be adopted was difficult, due to the patient's poor functional condition and risk of intra-operative hypotension and death, but endovascular treatment was also not suitable because of the possibility of aortic wall rupture and the presence of a contaminated field that could lead to infection of the graft. Our patient was operated on while recognizing the high operative risk, and he unfortunately passed away during anesthesia.

Conclusion

Our case highlights a rare and fatal association between EPN and an infected abdominal aortic pseudoaneurysm. Early recognition and prompt imaging are essential in diabetic patients presenting with signs of sepsis and abdominal symptoms. The coexistence of these two severe infections presents significant diagnostic and therapeutic challenges, emphasizing the need for rapid multidisciplinary intervention to improve outcomes.

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