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Emphysematous Pyelonephritis Cured by Antibiotics Alone: Radiologic Diagnosis

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Abstract **Case Report**

Emphysematous pyelonephritis is a rare necrotizing infection of the kidney with a poor prognosis. If it occurs in patients with a reduced general condition, this infection is life threatening. It is characterized by the presence of gas within the renal parenchyma, excretory cavities or peri-renal spaces. Early diagnosis is made by computed tomography. Treatment options can be medical or surgical as it happens drainage and intensive care or immediate nephrectomy in severe cases. We report a 50 years old woman with diabetes with a diagnosis of EPN whose condition improved with antimicrobial and supportive therapy, and no surgical intervention was required.

Keywords: Emphysematous pyelonephritis, prognosis, Radiologic Diagnosis.

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INTRODUCTION

Emphysematous pyelonephritis refers to a morbid infection with particular gas formation within or around the kidneys. If not treated early, it may lead to fulminant sepsis and, therefore, carries a high mortality.

CASE DESCRIPTION

A 50 years old woman, treated with oral hypoglycemic agents (OHA), was admitted through the emergency department for straight back pain on sudden onset, without special irradiation. All evolving in a feverish context and conservation of the general condition.

The patient showed resistance to antibiotic therapy adapted to Escherichia coli. The initial kidney ultrasound showed right nephromgaly associated with an inferior polar abscess, Figure 1.

The renal CT scan showed PNE that can be classified stage 3A; made of: air bubbles at the level of the renal parenchyma fusing into extra renal and upper renal collecting system complicated by a renal abscess in the inferior pole.

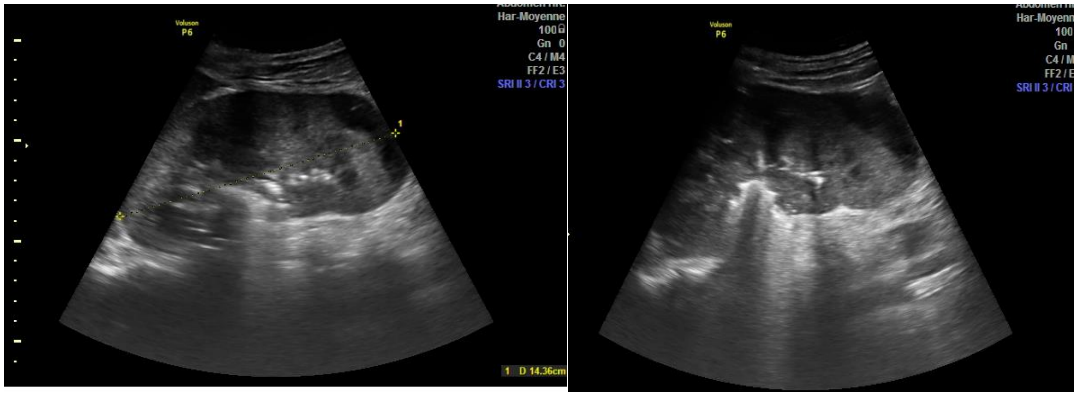

Figure 1: Kidney ultrasound showing nephromegaly with inferior polar abscess

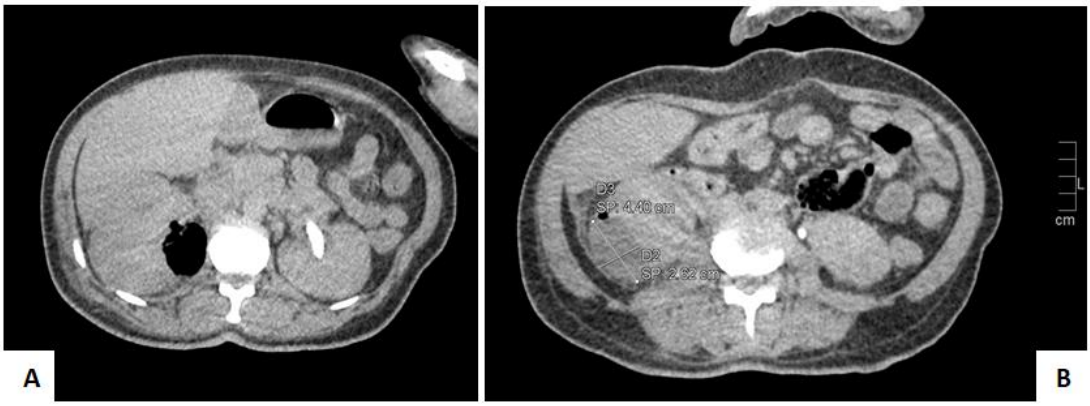

Figure 2: CT scan showing air bubble at the level of renal parenchyma (A) and abscess in the inferior pole (B)

After the patient was put on meropenem, she has improved clinically and biologically; has no fever and CRP decreased from 383 to 167.

The second renal ultrasound showed a decrease in the volume of the renal abscess (Figure 3).

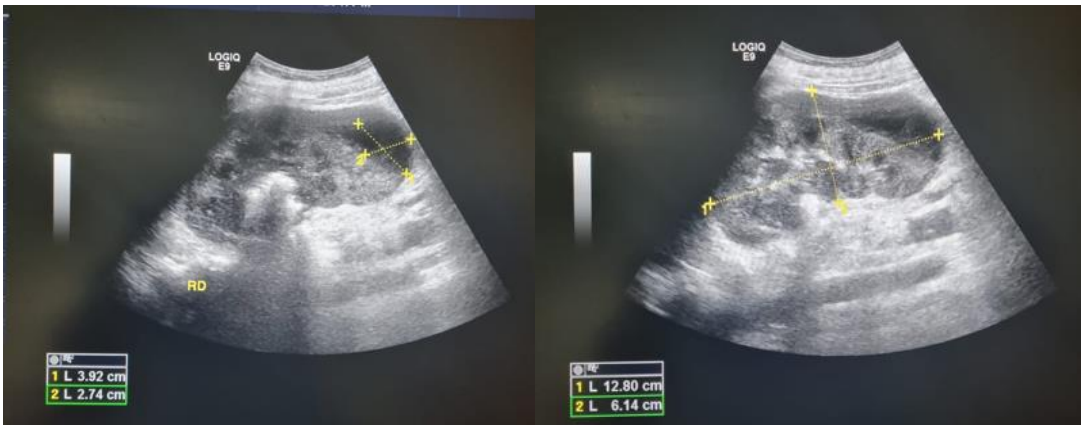

Figure 3

DISCUSSION

Emphysematous pyelonephritis (PNE) is a severe, necrotizing form of acute bacterial pyelonephritis [1].

Although, Kelly and Mac Callum described the first case in 1898, Schultz and Klorfein introduced the emphysematous pyelonephritis term in 1962 [2].

The most often implicated germ is Escherichia coli, which is responsible for 60% of cases. The predisposing factors are: diabetes mellitus, infection recent or old kidney and obstruction.

The pathogenesis of emphysematous pyelonephritis appears to involve 4 factors: high tissue glucose, gas-forming bacteria, a defective immune response, and impaired tissue perfusion. Predisposing factors indicating poor prognosis include acute renal failure, shock, altered consciousness, and thrombocytopenia [3]. In our case, poor regulation of blood glucose (DM) was the only predisposing factor observed. This was most likely due to the noncompliance with her medication. This further reinforces the observation by several studies that DM is the most prevalent comorbidity in emphysematous pyelonephritis patients, with an incidence of about 85% [4, 5]. This trend is observed because DM offers an ideal environment for developing emphysematous pyelonephritis; high glucose concentrations in tissues, impaired tissue perfusion, and the presence of gas-producing organism [6]. The glucose serves as a substrate for the gas-producing organism, which in turn produces carbon dioxide and hydrogen by fermentation [6].

It is thought that urinary albumin serves as a substitute for glucose in non DM patients but glucose is the preferred substrate by the gas-producing organisms, accounting for the high prevalence of emphysematous pyelonephritis cases in DM patients [6].

There is a female predominance (2/1). Unprepared urinary tree reveals emphysema renal in 85% of cases. The kidney ultrasound shows hyperechoic areas with reverberation corresponding to gas bubbles. The CT scan is the best technique, allowing precise localization of the gas site in the renal parenchyma or in the collecting system [2].

Huang and Tseng established a radiological classification with prognostic value, conditioning the therapeutic choice 1) stage 1: gas in the excretory tract only. 2) Stage 2: gas in the renal parenchyma without extension into the extrarenal space. 3) Stage 3A: gas extension or abscess of the perinephretic space. 4) Stage 3B: gas extension or abscess of the pararenal space. 5) Stage 4: bilateral emphysematous pyelonephritis or on a single kidney [2].

Emphysematous pyelonephritis is a therapeutic emergency. Symptomatic treatment of hemodynamic disorders, hydro electrolyte and organ dysfunction is essential and nonspecific, and must be done in the intensive care unit.

Three main modalities have been adopted to treat PNE: The exclusive medical treatment. The treatment associated with percutaneous or surgical drainage, and the radical treatment that is nephrectomy. Antibiotics used must be active against Gram-negative bacilli, administered to high dose parenterally and in synergistic combination.

The initial probabilistic antibiotic therapy usually combines third generation cephalosporin or imipenem to a fluoroquinolone or an aminoglycoside. This treatment will be adapted to bacteriological results.

Huang (2000), in his series of 48 patients (the most of literature) had defined 4 major classes radiological findings of PNE, with indications that have been adopted by the majority of authors in recent publications.

1) For localized PNE (class 1 and 2), percutaneous drainage and / or removal of an obstruction combined with medical treatment would give good results. 2) For the extended PNE (class 3 and 4) with mild manifestations (less than two risk factors), percutaneous drainage combined with medical treatment would be the 1st line conduct. 3) For the extended PNE with a fulminant course (two or more risk factors), nephrectomy provides the best results and should be quickly carried out. Validated recommendations for an optimal treatment is not yet established, but the treatment conservative occupies more and more space due to progress carried out in terms of antibiotic therapy and resuscitation means, as well as in the field of medical imaging.

CONCLUSION

The course of the disease is the basis of its radiological classification into 4 stages. PNE remains a poor prognosis if medical treatment isolated is established. Any urinary tract infection in a diabetic patient, symptomatic or not, should be treated and should be performed kidney ultrasound to rule out a severe form. In the absence of improvement under appropriate antibiotic therapy, the suspicion of PNE should lead to a CT scan, the examination of choice to confirm the diagnosis and make an accurate assessment of the lesions.

REFERENCES

1. Kably, M. I., Elamraoui, F., & Chikhaoui, N. (2003, October). Pyélonéphrite emphysémateuse: diagnostic radiologique. In *Annales d'urologie* (Vol. 37, No. 5, pp. 229-232). Elsevier Masson.
2. Lasri, A., Saouli, A., Yddoussalah, O., Karmouni, T., Elkhader, K., Koutani, A., & attya Andaloussi, A. I. (2018). La pyélonéphrite emphysémateuse à évolution favorable après traitement médical: à propos de 3 observations. *The Pan African Medical Journal*, *30*. Disponible sur: http://www.panafrican-med-journal.com/content/article/30/223/full/
3. Mahashabde, M., Kumar, S., & Borawake, K. (2013). Extensive bilateral emphysematous pyelonephritis with calculi managed conservatively with antibiotics and DJ stent. *Medical Journal of Dr. DY Patil University*, *6*(4), 447.
4. Emphysematous pyelonephritis: Changing trend of clinical spectrum, pathogenesis, management and outcome [Internet]. [cité 24 nov 2021]. Disponible sur: http://www.turkishjournalofurology.com/en/emphysematous-pyelonephritis-changing-trend-of-clinical-spectrum-pathogenesis-management-and-outcome-133035
5. Aboumarzouk, O. M., Hughes, O., Narahari, K., Coulthard, R., Kynaston, H., Chlosta, P., & Somani, B. (2014). Emphysematous pyelonephritis: Time for a management plan with an evidence-based approach. *Arab Journal of Urology*, *12*(2), 106-115.
6. Kuzgunbay, B., Turunc, T., Tokmak, N., Turunc, T., Dirim, A., Aygun, C., & Ozkardes, H. (2011). Tailored treatment approach for emphysematous pyelonephritis. *Urologia internationalis*, *86*(4), 444-447.