



Inflammation and infection

Emphysematous infection of a solitary renal cyst: A case report and literature review



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ARTICLE INFO

Keywords:

Solitary renal cyst
Emphysematous
Infection

Introduction

Solitary serous renal cysts are common but their suppuration is rare. Cystic infection is usually a complication of autosomal-dominant polycystic kidney disease (ADPKD). Indeed, they account for approximately 10% of causes for hospitalization in patients with adult polycystic kidney disease.¹ Herein, we report an extremely rare case of an emphysematous infection of a solitary renal cyst. To the best of our knowledge, this is the eighth case of a gas-forming infection of a renal cyst being reported in the literature.^{2,3}

Case report

An 84-year-old female patient with no past medical history especially no diabetes mellitus, presented with a history of right flank pain since five days with fever. There was no recording of urinary tract symptoms. Her WHO Performance Status was equal to 2. On physical examination, she was dehydrated, lethargic and febrile (38.5 °C) with low blood pressure (80/40 mmHg) and a high heart rate of 120 beats/min. Abdominal examination revealed tenderness in the right upper quadrant and guarding in the right lumbar fossa. Laboratory investigations showed an elevated white blood cell count of $27.7 \times 10^3/\text{mm}^3$ with 90% neutrophils and a high level of C-reactive protein (344 mg/L). Creatinine blood level was equal to 16.2 mg/L and blood sugar level was normal (5.55 mmol/L). She was acidotic with pH = 7.28. Urinalysis showed no bacterial growth. Blood culture showed a significant growth of *Proteus mirabilis*.

A computed tomography (CT) scan of the abdomen was performed after intensive care and antibiotics (intravenous cefotaxime 100 mg per Kg of weight per day and metronidazole 7.5 mg per Kg q6 hours). It

revealed a massive cyst (84 × 77 × 60 mm) in the upper pole of the right kidney containing extensive mottled gas with air fluid level within the cyst (Figs. 1 and 2 and Fig. 3).

There was no evidence of gas in the renal parenchyma and there was no obstruction of the urinary tract. Also, there was no other site of infection.

The positive blood cultures and CT findings were highly suggestive of a *Proteus mirabilis* emphysematous cystic infection. Given the critical condition of the patient and the severity of the infection, she underwent an urgent right nephrectomy through lumbotomy. The puncture of the fluid cyst, and the culture was also positive for proteus mirabilis. The postoperative course was simple and the patient was discharged after one week of hospitalization with oral amoxicillin–clavulanic acid for two weeks. Follow-up after one month showed no clinical particularities and ultrasound exploration was normal.

Histopathological examination of the cyst confirmed its serous nature and excluded a complicated hydatid renal cyst.

Discussion

Emphysematous renal cyst infections are extremely rare. Only seven cases were reported in the literature. Six cases occurred in patients with ADPKD² and only one case was reported in a solitary renal cyst.³ The rarity of this condition and the particularity of it happening in a solitary renal cyst in an immunocompetent patient made our case report worth publishing.

Apart from iatrogenic germ inoculation after percutaneous puncture, the etiology of suppuration in solitary renal cysts is obscure. Theories incriminate hematogenous bacterial spread from a remote infected site or a transmission through the cyst wall from a site of

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<https://doi.org/10.1016/j.eucr.2018.09.020>

Received 12 August 2018; Received in revised form 19 September 2018; Accepted 25 September 2018

Available online 28 September 2018

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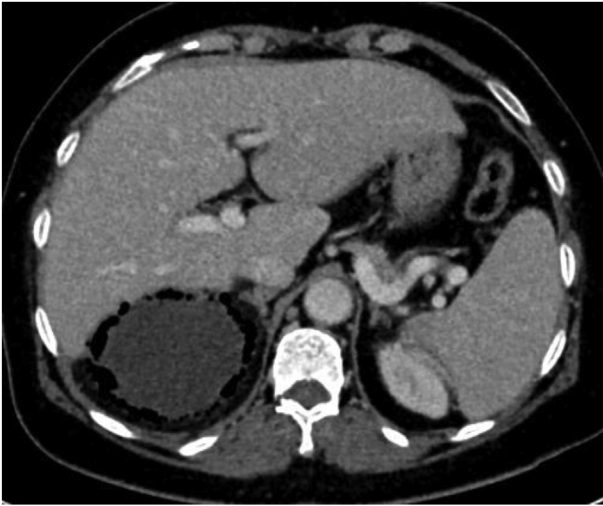


Fig. 1. CT scan showing the gas within the cyst with air fluid level.

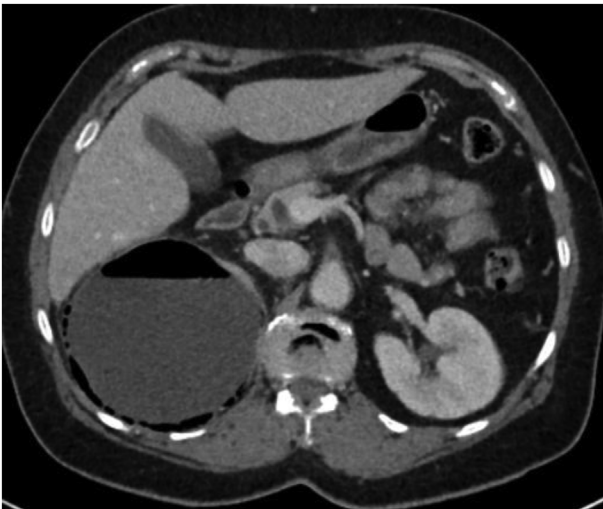


Fig. 2. CT scan showing the gas within the cyst with air fluid level.

pyelonephritis.⁴

It has been postulated that the development of emphysematous pyelonephritis (EPN) requires the presence of gas-forming bacteria, high tissue glucose level, impaired tissue perfusion and gas transport and a defective immunity.⁵ However, our patient did not have diabetes mellitus or any obvious cause of immunodeficiency. The aging process could be responsible of an impaired tissue perfusion in our case. The most recognized hypothesis for gas production during EPN is a mixed acid fermentation of glucose by Enterobacteriaceae (eg, *E coli*, *K pneumoniae*, and *Proteus* species) under anaerobic conditions.⁵ *Escherichia coli*, *Klebsiella pneumoniae* and *Clostridium perfringens* were incriminated in previous cases. In our case, *Proteus mirabilis* was isolated from blood cultures.

In the previous reported cases, one patient responded well to only antibiotics without any form of surgical intervention, another one was successfully treated with combination of intravenous and intracystic antibiotics, two patients underwent urgent nephrectomy with favorable outcome, one patient died despite adequate antibiotics and nephrectomy and another patient died before the planned urgent nephrectomy. In the last case report, the patient underwent percutaneous drainage and a double J ureteral stent drainage along with antibiotics but had a fatal outcome. Our patient underwent an urgent nephrectomy with a favorable outcome while a conservative treatment by



Fig. 3. CT scan sagittal view showing a massive cyst in the upper pole of the right kidney containing extensive mottled gas.

percutaneous drainage and antibiotics could have been proposed. This condition was considered as a stage 3 EPN with clinical severity criteria justifying the urgent nephrectomy.

Conclusion

Emphysematous renal cyst infection is a rare entity reported especially in patients with autosomal-dominant polycystic kidney disease. While conservative treatment for emphysematous pyelonephritis has proved its efficiency, the severity of this rare condition may require immediate nephrectomy.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.eucr.2018.09.020>.

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