CASE REPORT

Renal Abscess – A Case Report

Ana Maria SANDU[1], Ioana Adriana SERBAN[1], Gabriel CEAPA[1], Camelia DIACONU[1,2,3], Mihaela HOSTIUC[1,2]

[1] Department of Internal Medicine, Clinical Emergency Hospital of Bucharest, Romania
[2] University of Medicine and Pharmacy "Carol Davila" Bucharest, Romania
[3]Academy of Romanian Scientists

Address for correspondence: Ioana Adriana Șerban, Department of Internal Medicine, Clinical Emergency Hospital of Bucharest, Bucharest, Romania, e-mail: ioanaadrianaserban@gmail.com

Abstract

Introduction. *Renal abscesses can be the result of haematogenous spread or as a rare complication of upper UTI particularly in the setting of renal stones or diabetes. Classically it may present as loin pain, fever, rigors, and tenderness in the costovertebral angle, but may simply manifest as a pyrexia of unknown origin and a raised acute phase response.*

Case report. *We report the case of a 73-year-old female patient with type 2 diabetes mellitus, who presented for abdominal pain, chills, confusion and deterioration of general condition with progressive aggravation of the symptoms, the clinical examination revealed a respiratory rate of 14 breaths per minute, blood oxygen saturation of 98%, heart rate 82 beats per minute, blood pressure 137/75 mmHg and no fever. She had peripheral cyanosis and peripheral pulses were weak in the lower limbs; diuresis was present on the urinary catheter the laboratory and imaging investigations showed inflammatory syndrome (CRP=255 mg/l) and the CT showed both kidneys with normal position, a bilateral reduction in renal size, bilateral dilated pyelocaliceal system grade I developed a left renal abscess as a complication of acute pyelonephritis. The primary pathogen identified was Escherichia Coli. Computed tomography revealed a well-defined mass on the left kidney with low attenuation in contact with the renal fascia. Broad spectrum antibiotics and haemodialysis were used as part of conservative management regimen. The patient achieved clinical improvement after 3 weeks and was discharged.*

Conclusions. *The particularities of the case are represented by the fulminant evolution of the infection in a patient with poorly controlled diabetes, the acute kidney injury caused by urosepsis and the progression of pyelonephritis towards the development of a renal abscess. Diabetes mellitus is a disease with a significant prevalence, the incidence of which increases with age and which develops multiple complications. In addition to vascular lesions, diabetic neuropathy or nephropathy, patients have a high risk of developing an infection, the most common being those of the upper urinary tract, which evolve aggressively. The renal abscess is a rare complication of pyelonephritis, but it is to be considered in patients with persistent inflammatory state in despite of the right management.*

Keywords: renal abscess, diabetes mellitus, pyelonephritis, acute kidney injury

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Introduction

Renal and perinephric abscesses are uncommon; however they can become potentially lethal complications of urinary tract infection. Intra-renal abscess or a "renal carbuncle" is encapsulated necrotic material within the renal parenchyma and account for 0.2% of all intraabdominal abscesses [1]. The predisposing factors for renal abscesses include diabetes mellitus, ureteral obstruction, vesical-ureteral reflux and renal calculi. A retrospective analysis performed during 2002-2009 in Western Romania showed a percentage of 1.5% of patients with upper urinary tract infections who developed renal abscess and the most frequently isolated pathogen was Escherichia Coli-25% and rarely other germs (e.g. Citrobacter and Candida albicans) [2]. In the past, renal abscesses were associated with significant morbidity and mortality, which was in part due to their obscure symptoms and lack of detection using low quality imaging systems [3,4]. Recently, computed tomography and magnetic resonance imaging have become more available, and the quality of renal ultrasound examination has increased. The advances in imaging techniques have led to earlier diagnosis of renal and perinephric abscesses. Furthermore, novel antibiotics and percutaneous drainage have reduced surgery-related morbidity and mortality [5,6]. The diagnostic and treatment developments are believed to have improved outcomes for the disease process [7].

Case report

A 73- year-old female patient with type 2 diabetes mellitus insulin-dependent, ischemic heart disease and superficial femoral artery stenosis, who had been experiencing abdominal pain, chills, confusion, and deterioration of general condition with progressive aggravation of the symptoms was admitted to the Department of Internal Medicine, Clinical Emergency Hospital of Bucharest, Romania. The initial physical examination revealed a respiratory rate of 14 breaths per minute, blood oxygen saturation of 98%, heart rate 82 beats per minute, blood pressure 137/75 mmHg and no fever. She had peripheral cyanosis and peripheral pulses were weak in the lower limbs; diuresis was present on the urinary catheter. The patient also reported transit disorder, diarrhea in the last two days. The remaining physical examination was unremarkable. The results of routine laboratory tests are presented in Table 1.

Table 1. The results of routine laboratory tests performed at admission.

Parameters	Results	Normal reference values
White cell count	19.09x10^3/µL	4-9 x10^3/µL
Haemoglobin	9.28 g/dL	11.7-16.0 g/dL
Glucose	180 mg/dL	65.00-105.0 mg/dL
Serum Creatinine	4.37 mg/dL	0.60-1.20 mg/dL
Urea	157.9 mg/dL	15-37 mg/dL
Fibrinogen	258 mg/dL	200-393 mg/dL
C-reactive protein	255.63 mg/L	0.000-5.00 mg/L

The electrocardiogram showed normal sinus rhythm with no signs of ischemia. The chest X-ray and the abdominal anterior-posterior X-ray showed accentuation of bilateral perihilar interstitial opacities and horizontalization of the heart, without signs of pneumoperitoneum. Due to the reported diarrhea, Clostridioides difficile toxins A/B were tested and have been found negative. The subsequent computed tomography (CT) result showed both kidneys with normal position, a bilateral reduction in renal size, bilateral dilated pyelocaliceal system grade I (Fig. 1).

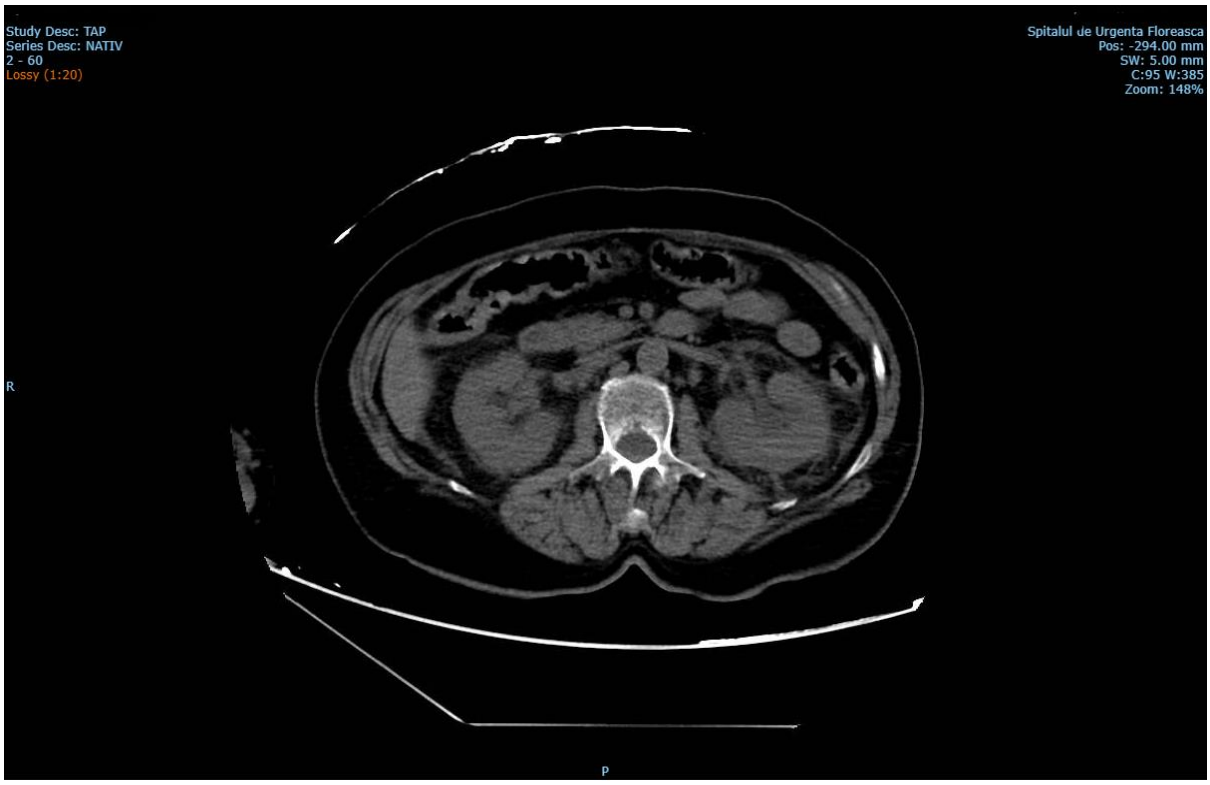

Fig. 1. Nonenhanced computed tomography (CT) images showing a bilateral reduction in renal size.

Moreover, the urine culture yielded *Escherichia coli* multisensitive. Acute pyelonephritis was diagnosed, and intravenous antibiotics with piperacillin-tazobactam 4.5g q6h were prescribed for 7 days. Considering the nitrogen retention syndrome, with a serum creatinine of 5.5 mg/dL (eGFR=8ml/min/1.73m^2) a nephrology consultation was requested, with the following recommendations: strict monitoring of diuresis, diuretic treatment with furosemide 240mg/day via continuous iv infusion, maintaining blood pressure (BP) greater than 110 mmHg, avoidance of nephrotoxic drugs and reevaluation when necessary. In the following days there had been progressive impairment of renal function, with an increase of serum-creatine levels and a declining eGFR= 4ml/min/1.73m^2, thus haemodialysis was initiated via a central catheter. A follow up abdominal CT scan was performed on the 14th day of hospitalization, which revealed a well-defined mass of 35/30/47 cm on the left kidney, with low attenuation, in contact with the renal fascia, infiltrating it and focal perirenal fatty blurring (Fig. 2).

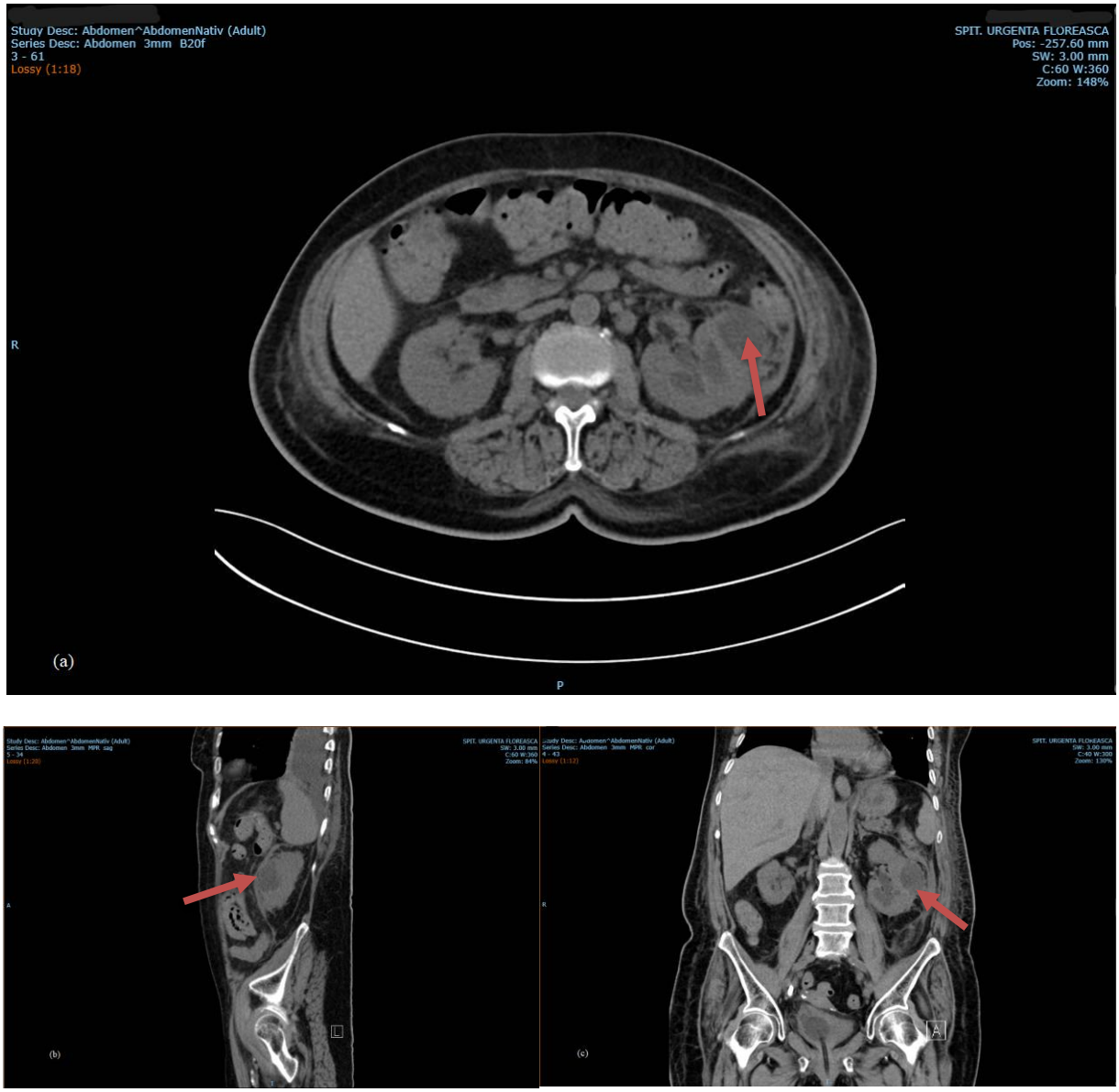

Fig. 2 (a,b,c). Nonenhanced computed tomography (CT) images showing a well-defined mass of 35/30/47 cm on the left kidney, with low attenuation.

The patient presented persisting symptoms of abdominal pain and dysuria; the physical examination revealed diffuse pain on deep abdominal palpations, with no signs of peritoneal irritation and no changes in cardio-pulmonary auscultation. A second urine culture was positive for *Candida albicans*, thus an antimycotic (Fluconazol 200 mg loading dose, followed by 100 mg per day for 7 days) was added to the therapeutic regimen. Considering the escalation of the inflammatory syndrome, an infectious disease consultation was required, with the following recommendations: intravenous antibiotherapy with moxifloxacin 400 mg per day and vancomycin 1g per day after the dialysis session, associated to the previous therapeutic regimen. The patient achieved clinical improvement after three weeks and was discharged.

Discussion

Renal and perinephric abscesses are uncommon; however they can become potentially lethal complications of urinary tract infection. Renal abscesses can be the result of haematogenous spread or a rare complication of upper UTI particularly in the

setting of renal stones or diabetes. As presented in our case, renal corticomedullary abscesses most commonly occur in individuals with diabetes mellitus with or without urinary tract obstruction [8]. Classically, it may present as loin pain, fever, rigors, and tenderness in the costovertebral angle, but may simply manifest as a pyrexia of unknown origin and a raised acute phase response. A renal abscess may not be associated with a positive urine culture or may arise following inadequate treatment of pyelonephritis and should always be considered in a patient with pyelonephritis not responding rapidly to treatment [9]. Most renal abscesses are caused by enteric Gram-negative bacilli, often associated with urinary tract abnormalities. *E. coli* is responsible for 75% of these infections. Approximately 15-20% of cases are caused by *Klebsiella*, *Proteus*, *Enterobacter*, and *Serratia* species. The few remaining cases of renal corticomedullary abscess are caused by gram-positive bacteria, including *Streptococcus faecalis* and, less commonly, *S. aureus* [10].

As with other renal infections, CT scan is the imaging of choice, but ultrasonography (US) is helpful if aspiration or sequential imaging is required. Renal abscess is characterized by hypoechoic or anechoic complex masses at ultrasound, with increased transmission of US and borders that become defined as the abscess encapsulates. Internal echoes, moving with patient position, may also be seen within the cavity, forming solid–fluid interfaces or echogenic areas with acoustic shadows suggestive of air, there may also be present loculations and septations [11]. US is less sensitive than CT scan in the detection of abscesses and on many occasions, it fails to detect abscesses seen on CT. CT is the most accurate imaging investigation for the diagnosis and follow up regarding the evolution of the abscess. Abscesses initially appear as peripheral cortical lesions and are small wedge or rounded areas of hypoattenuation on CT or a well-defined low-density mass with a postcontrast enhancement of an abscess wall [11,12]. The mature abscess is sharply marginated, with peripheral enhancement in up to half of cases and the thick and irregular wall or pseudocapsule is better demonstrated after enhancement and often during the excretory phase, when there is contrast material in the pelvicalyceal system [11]. On magnetic resonance imaging (MRI), abscesses appear as low, inhomogeneous signal intensity on T1-weighted imaging with increased inhomogeneous signal on T2-weighted imaging depending on amount of protein, fluid and cellular debris present [13]. MRI is seldom a first-line investigation.

Most renal abscesses respond to appropriate parental antibiotics, without the need for percutaneous drainage, but the bigger the abscess, the less likely conservative management will be effective without percutaneous or sometimes surgical drainage [9]. Early diagnosis and antibiotic therapy are essential for a good clinical outcome. An immediate intravenous therapy, with coverage for Enterobacteriaceae (if suspected association with pyelonephritis) and staphylococcal bacteraemia for 3–6 weeks is recommended. Subsequently, the initial antibiotic regimen should be tailored to culture and susceptibility results [12]. Small sized renal abscesses (<3cm), as well as medium sized renal abscesses (3-5 cm), are successfully treated with intravenous antibiotic therapy alone, especially if therapeutic drainage is deemed to be a considerable risk.

Conclusions

In conclusion, this case report is an example of medium sized renal abscess, which presented as a complication of acute pyelonephritis in a patient with associated risk factors (diabetes mellitus type 2 insulin requiring). Numerous reports observed that medium renal abscesses were effectively treated with a course of intravenous antibiotics. The key features of management of renal abscess are prompt identification of risk factors, diagnosis with the use of computed tomography and adequate treatment.

Author Contributions:

H.M, C.D., A.S, I.S., and G.C. conceived the original draft preparation. H.M, C.D., A.S, I.S., and G.C. were responsible for conception and design of the review. A.S., I.S., and G.C. were responsible for the data acquisition. G.C, was responsible for the collection and assembly of the articles/published data, and their inclusion and interpretation in this review. H.M, C.D., A.S, I.S., and G.C contributed equally to the present work. All authors contributed to the critical revision of the manuscript for valuable intellectual content. All authors have read and agreed with the final version of the manuscript.

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References

[1] Jaik NP, Sajuitha K, Mathew M, Sekar U, Kuruvilla S, Abraham G, Shroff S. Renal abscess. *J Assoc Physicians India*. 2006;54:241-3.

[2] Velciov S, Gluhovschi G, Trandafirescu V, et al. Specifics of the renal abscess in nephrology: observations of a clinic from a county hospital in Western Romania. *Rom J Intern Med*. 2011;49(1):59-66.

[3] Fowler JE, Jr, Perkins T. Presentation, diagnosis and treatment of renal abscesses: 1972-1988. *J Urol.* 1994;151:847–851.

[4] Adachi RT, Carter R. Perinephric abscess: current concepts in diagnosis and management. *Am Surg.* 1969;35:72–75.

[5] Hoverman IV, Gentry LO, Jones DW, Guerriero WG. Intrarenal abscess: report of 14 cases. *Arch Intern Med.* 1980;140:914–916.4

[6] Hwang YJ, Woo YN. Percutaneous management of the renal and perirenal abscess. *Korean J Urol.* 1994;35:261–264.

[7] Coelho RF, Schneider-Monteiro ED, Mesquita JLB, et al. Renal and perinephric abscesses: analysis of 65 consecutive cases. *World J Surg.* 2007;31:431–436.

[8] Ko MC, Chiu AW, Liu CC, et al. Effect of diabetes on mortality and length of hospital stay in patients with renal or perinephric abscess. *Clinics (Sao Paulo).* 2013;68(8):1109-14.

[9] Turner NN, Turner NN, Lameire N, et al., eds. *Oxford Textbook of Clinical Nephrology: Three-Volume Pack.* 4 edn ed. Oxford, UK: Oxford University Press; 2015.

[10] Baas WR. Renal corticomedullary abscess. Practice Essentials, Pathophysiology, Etiology. http://emedicine.medscape.com/article/440073-overview#a7. Published January 21, 2022.

[11] Browne RFJ, Zwirewich C, Torreggiani WC. Imaging of urinary tract infection in the adult. *Eur Radiol Suppl* 2004;14:E168–E183.

[12] Cancelinha C, Santos L, Ferreira C, Gomes C. Renal abscesses in childhood: report of two uncommon cases. *BMJ Case Rep*. 2014;2014:bcr2013202408.

[13] Goldman SM, Fishman EK. Upper urinary tract infection: the current role of CT, ultrasound, and MRI. *Semin Ultrasound CT MR*. 1991;12(4):335-60.