

CASE REPORT

Renal abscesses in childhood: report of two uncommon cases

Candida Cancelinha, Lea Santos, Carmen Ferreira, Clara Gomes

Department of Hospital
Pediátrico, Centro Hospitalar
Universitário de Coimbra,
Coimbra, Portugal

Correspondence to
Dr Candida Cancelinha,
candidacancelinha@gmail.com

Accepted 3 March 2014

SUMMARY

Renal abscesses are rare conditions in children, but they must be remembered in differential diagnosis of fever and abdominal pain. The authors report two paediatric cases with unusual presentation. Case 1: a 15-year-old girl was admitted following a period of fever, vomiting and left hypochondrium pain which became more localised to the left lower ribs. Blood tests suggested bacterial infection, but urinalysis and culture were negative. Renal CT scan presented features of bilateral pyelonephritis and left renal abscesses, while ultrasound remained normal until the ninth day of disease. Case 2: a 2-year-old girl, with diagnosis of β -thalassaemia minor, had intermittent diffuse abdominal pain with 2 weeks of evolution. Renal ultrasonography and CT scan showed a heterogeneous mass compatible with Wilms tumour. Intraoperative diagnosis was compatible with renal abscess with isolation of *Proteus mirabilis* in the fluid. Both responded well to long-term antibiotics and to surgical drainage (in the second case).

BACKGROUND

Although infrequently encountered in children, renal abscesses are potentially lethal complications that may occur following pyelonephritis, or secondary to primary bacteraemia.^{1 2}

Predisposing factors such as diabetes mellitus and urinary tract abnormalities (mainly lithiasis and ureteral obstruction) are commonly reported in adults,³ while urological abnormalities and vesicoureteral reflux are common in paediatric patients.^{1 4 5}

Signs and symptoms are vague and may include fever and abdominal pain.^{4 6 7} There is usually raised erythrocyte sedimentation rate (ESR), C reactive protein (CRP), leukocytosis and less often positive blood and urine cultures, delaying the correct diagnosis.⁴⁻⁶ Gram-negative agents (mainly *Escherichia coli*) are the most common pathogens found if there is previous urinary tract infection (UTI); *Staphylococcus aureus* predominate when haematogenous spread occurs.⁶⁻⁹

Because of the low specificity of sonographic images, additional CT scan is usually required for renal abscess detection as well as definition of the disease extension. During the last decades, technological improvements increased the quality of renal ultrasound and CT examinations, so definitive diagnosis of renal abscesses became faster than before.⁴

This manuscript describes two cases with renal abscess, with the purpose of increasing physician's awareness for this rare condition, since accurate

diagnosis and appropriate therapy are essential to minimise renal damage.

CASE PRESENTATION**Case 1**

A previously healthy 15-year-old girl, sexually active, with no history of UTI, was admitted to the hospital during winter, with high fever developed 2 days ago. Simultaneously, she had symptoms such as myalgias, chill, running nose, cough, vomiting and pain in the left upper abdominal quadrant, worsening with deep breath. Examination was unremarkable. Chest X-ray showed no opacities and she was discharged home diagnosed with flu syndrome.

On day 5 of disease, the patient returned with persisting symptoms, such as spiking fever (maximum 40°C axillary), vomiting and left thoracic/left hypochondrium pain, but with normal respiratory rate and transcutaneous oxygen saturation 100% in room air. She presented haemodynamic stability (cardiac rate 98/min, blood arterial tension 110/56 mm Hg) and 38.6°C axillary temperature, with normal capillary refill time. Physical examination revealed diffuse pain on deep abdominal palpation with no signs of peritoneal irritation and no changes in cardiopulmonary auscultation on throat inspection. The chest X-ray remained normal. Blood tests revealed elevated white cell count (15 220/mm³) with neutrophilia (12 080/mm³) and CRP of 40.7 mg/dL; serum blood urea nitrogen (BUN), creatinine and ionogram were normal. Urinalysis was normal and urine and blood cultures were negative. An abdominal and renal ultrasound as well as an echocardiogram were performed, both showing no changes.

Diagnosis of bacteraemia was equated and the patient was started on intravenous ceftriaxone. On day 7 of disease, pain became more localised with tenderness in the left lower ribs.

Case 2

A 2-year-old girl with a history of β -thalassaemia minor, presented with intermittent diffuse abdominal pain with 2 weeks of evolution. She had neither fever nor gastrointestinal or urinary symptoms. Physical findings were paleness, abdominal tenderness and palpable mass in the left flank. Blood tests showed leukocytosis (17 800/mm³) with neutrophilia (14 400/mm³), haemoglobin 8.4 g/dL, thrombocytosis (714 000/mm³), CRP 3.7 mg/dL, ESR 3 mm/1st, lactate dehydrogenase 952 U/L and uric acid 155 μ mol/L; serum BUN and creatinine were normal.



CrossMark

To cite: Cancelinha C, Santos L, Ferreira C, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2013-202408

INVESTIGATIONS

Case 1

Blood tests were repeated with $12\,400/\text{mm}^3$ white cell count and $8800/\text{mm}^3$ neutrophils, CRP 33.9 mg/dL, ESR 128 mm/1st hour and procalcitonin 0.57 ng/mL. Renal function and ionogram remained normal. Urinalysis showed 10 leucocytes per field with no nitrites or proteinuria. Renal ultrasound remained normal. Diagnosis of thoracic osteomyelitis or bacteraemia with secondary focalisation was equated. Thoracic and abdominal CT image analysis revealed features of acute bilateral pyelonephritis in addition to two hypodense nodular masses with foci of reduced attenuation compatible with renal abscesses in the left kidney, the largest measuring about 1.6 cm (figure 1).

Case 2

Abdominal and renal ultrasound showed a heterogeneous mass with well-defined borders on the upper third of the left kidney with some areas of necrosis, measuring about $5.5 \times 4.8 \times 5.3$ cm (figure 2). CT scan confirmed the presence of a solid mass with hypodense centre in the upper third of the left kidney and extending to the perinephric adipose tissue, measuring $7 \times 6 \times 5$ cm, and enlarged lymphatic nodes in the left renal hilum.

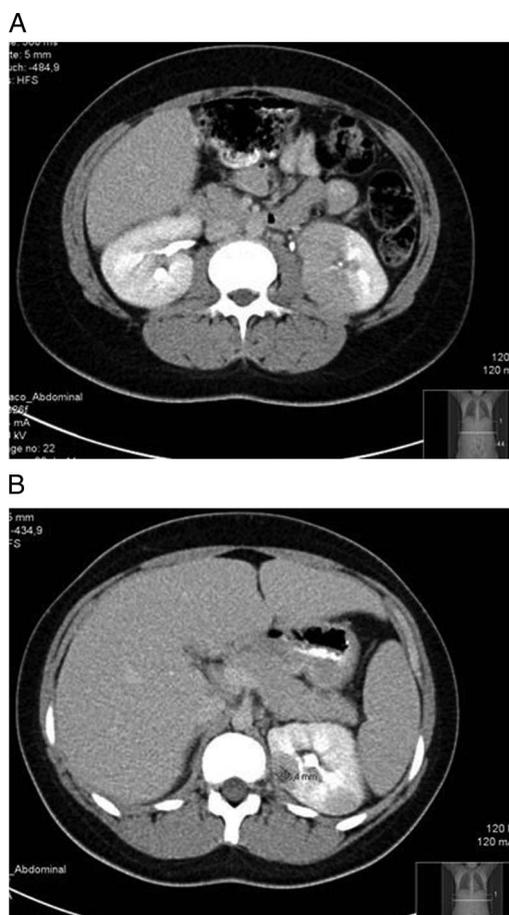


Figure 1 Abdominal CT scan with features of acute bilateral pyelonephritis, with a globus left kidney and multiple hypodense pseudonodular areas (A) in addition to two hypodense nodular masses with foci of reduced attenuation compatible with renal abscesses in the upper pole of the left kidney (B).

A



B



Figure 2 Abdominal ultrasound with a heterogeneous mass with well-defined borders on the upper third of the left kidney (A) with some areas of necrosis (B).

TREATMENT

Case 1

On the basis of these findings, a diagnosis of bilateral pyelonephritis complicated with left renal abscesses was made, and intravenous flucloxacillin was associated to ceftriaxone.

Case 2

On the basis of the presumptive diagnosis of a Wilms tumour, she underwent surgical mass excision. Intraoperative diagnosis was renal abscess of the upper third of the left kidney, extending to the perinephric adipose tissue. Surgical drainage was performed and a catheter was left in place until day 5. Culture of the fluid was positive for *Proteus mirabilis*, susceptible to cephalosporins and amoxicillin-clavulanic acid. Pathological examination of adjacent renal tissue and a lymphatic node showed acute inflammatory changes. She was prescribed with intravenous ceftriaxone for 10 days followed by oral amoxicillin-clavulanic acid.

OUTCOME AND FOLLOW-UP

Case 1

The patient's general condition gradually improved becoming afebrile after the first 48 h of antibiotics. Laboratory markers normalised within -week. Blood and urine cultures remained negative. Renal ultrasound was repeated on day 9 of disease showing slight prominence and hypoechogenicity of the lower third of the left kidney, associated with a hypoechogenic nodule in the upper third of the same kidney; the right kidney appeared normal (figure 3).

She was discharged home, after 9 days of intravenous antibiotics, on oral cefuroxime axetil and flucloxacillin, completing 3 weeks of treatment. One month later renal ultrasound follow-up was normal. Technetium $^{99\text{m}}$ -dimercaptosuccinic



Figure 3 Renal ultrasound showing a hypoechoic mass lesion in the upper pole of the left kidney compatible with renal abscess, on day 9 of disease.

acid scintigraphy (^{99m}Tc DMSA) performed after 1 year revealed scar formation in the lower third of the left kidney, with similar differential function (left 48%, right 52%).

Case 2

The clinical outcome was favourable, with normalisation of the white cell count and progressive reduction of the mass in the follow-up renal ultrasound. Inflammatory markers, remained normal as well as urinalysis. Urine and blood cultures, performed under antibiotherapy, were negative.

Antibiotic intake was stopped after 2 months of treatment, as CT follow-up revealed complete resolution of the abscess formation.

A renal CT performed 1 year after the completion of treatment showed a small hypodense area on the upper third of the left kidney. ^{99m}Tc DMSA revealed scar formation in the upper third of the left kidney. Differential function was similar (left 49%, right 51%).

DISCUSSION

Renal abscesses are a very rare form of renal infection that occur predominantly in children without predisposing factors.^{4 7 8 10}

To the best of our knowledge, the largest paediatric series, previously reported, consisted of 45 patients treated during a period of 10 years, from 1997 to 2006. In this series, the most common clinical symptoms include fever, nausea/vomiting and abdominal or flank pain.⁴ Most difficulties arise in patients with non-specific symptoms and signs who present with vague discomfort and fever of unknown origin, with a diagnostic delay which can exceed 2 weeks.^{3 4 10} After the onset of symptoms and signs, an average of 9 days is required for the CT confirmation of renal abscess.⁴ Careful history taking and a high index of suspicion are essential for the diagnosis.

Although leukocytosis and elevation of the inflammatory markers are commonly observed, they may reveal no changes.^{8 10} Urinalysis may demonstrate pyuria and leukocyturia in the setting of abscess that complicates acute pyelonephritis.^{3 5 8 10} In contrast, urine studies may be normal if renal or perinephric abscess develops as a result of haematogenous spread and does not communicate with the collecting system, or if they are performed after the beginning of antibiotics, as in the second case.^{6 7 10}

Although the main pathogens involved are *E coli* and *S aureus*, there are some cases with identification of other

Gram-negative bacteria (*Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Salmonella* group B).^{4 10} We found no case reports with isolation of *P mirabilis* in children while it is a known UTI pathogen and a possible cause of renal abscess in adults.^{3 11} It should be kept in mind that urine and blood cultures may be positive in less than half of patients.^{3 4 10}

Renal abscess is characterised by a hypoechoic mass in ultrasound or a well-defined low-density mass with a postcontrast enhancement of an abscess wall on CT.^{1 5 10} CT imaging may also include features of acute pyelonephritis or acute lobar nephronia with the concurrent renal abscesses.⁴ However, neither the ultrasound nor the CT findings are specific and its appearance may not differ from that of a primary tumour or lymphoma.^{9 10} Therefore, in the second case, despite the contradictory findings in imagiology and intraoperative examination, the histopathology of adjacent renal tissue allowed the correct differential diagnosis with infected renal tumour. Moreover, the response to treatment and the follow-up CT confirmed the diagnosis to be a renal abscess.

More recent reports found no abscess was missed by ultrasound, but when the infection has not progressed to a distinct mass of sufficient size, ultrasound may just show an enlarged kidney, so that Cheng *et al*⁴ included marked nephromegaly as an indication for subsequent CT diagnosis of renal abscess. However, in the first case ultrasound was completely unremarkable until day 9 of disease, emphasising the importance of CT scan if renal abscess is suspected.

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, which was only possible in the second case. Patients with renal abscesses larger than 5 cm should be managed with percutaneous or open surgical drainage in conjunction with antimicrobial therapy.^{4 7} In the second case, the prolonged antibiotic treatment was determined by the extent of infection and the patient's imagiological abscess resolution.

^{99m}Tc DMSA renal scintigraphy is the most sensitive examination to detect acute renal inflammation extension area and the best to correlate with renal outcome. The majority of patients develops sequelae with renal scar.¹

Learning points

- ▶ Renal abscesses are uncommon conditions which have non-specific signs and symptoms that may delay the diagnosis.
- ▶ Early diagnosis and treatment are important to avoid serious complications.
- ▶ Ultrasonography commonly proves inadequate to define the abscess, and CT scan is often required.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Wang YT, Lin KY, Chen MJ, *et al*. Renal abscess in children: a clinical retrospective study. *Acta Paediatr Taiwan* 2003;44:197–201.

- 2 Edelstein H, McCabe RE. Perinephric abscess in pediatric patients: report of six cases and review of literature. *Pediatr Infect Dis J* 1989;8:167–70.
- 3 Coelho RF, Schneider-Monteiro ED, Mesquita JL, et al. Renal and perinephric abscesses: analysis of 65 consecutive cases. *World J Surg* 2007;31:431–6.
- 4 Cheng CH, Tsai MH, Su LH, et al. Renal abscess in children: a 10-year clinical and radiological experience in a tertiary medical center. *Pediatr Infect Dis J* 2008;27:1025–7.
- 5 Shimizu M, Katayama K, Kato E, et al. Evolution of acute focal bacterial nephritis into a renal abscess. *Pediatr Nephrol* 2005;20:93–5.
- 6 Fernandes RC, Duarte PD. Perinephric and renal abscesses in children: a study of three cases. *Rev Inst Med Trop S Paulo* 2002;44:341–4.
- 7 Vachvanichsanong P, Dissaneewate P, Patrapinyokul S, et al. Renal abscess in healthy children: report of three cases. *Pediatr Nephrol* 1992;6:273–5.
- 8 Higham M, Santos JJ, Grodin M, et al. Renal abscess without preexisting structural abnormality. *Pediatr Infect Dis* 1984;3:138–41.
- 9 Laufer J, Grisar-Soen G, Portnoy O, et al. Bilateral renal abscesses in a healthy child. *Isr Med Assoc J* 2002;4:1150–1.
- 10 Wippermann C, Schofer O, Beetz R, et al. Renal abscess in childhood: diagnostic and therapeutic progress. *Pediatr Infect Dis J* 1991;10:446–50.
- 11 Ismaili K, Wissing KM, Lolin K, et al. Characteristics of first urinary tract infection with fever in children—a prospective clinical and imaging study. *Pediatr Infect Dis J* 2011;30:371–4.

Copyright 2014 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.

BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow