

Urinary tract infection with renal abscess

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ABSTRACT

Renal abscess is very rare among intra-abdominal abscesses in children. Ascending infection is the most common cause in children compared to hematogenous spread in adults and *Escherichia coli* is the main pathogen. Persisting high-grade fever is an alarming sign to intervene and has to be taken care of. Here, we are presenting the case of a 3-year-old boy with *Klebsiella* urinary tract infection and *E. coli* renal abscess of 4 cm size. Contrast-enhanced computed tomography abdomen helped in early intervention and management. The child responded very well to parenteral antibiotics and ultrasound-guided percutaneous aspiration.

Key words: Ascending infection, Percutaneous aspiration, Renal abscess, Urinary tract infection

Renal abscess is very rare in the pediatric population [1]. It can be presented as an acute emergency or as a chronic condition. A renal abscess is a serious infectious disease that requires long-term treatment and is highly destructive to kidneys [2]. The clinical presentation of a renal abscess may be non-specific and can include fever, nausea/vomiting, flank pain, abdominal pain, elevated erythrocyte sedimentation rate, leukocytosis, and positive blood/urine cultures [3]. With the advancement in imaging, a renal abscess can be readily differentiable from other renal mass lesions and acute renal nephronia [4]. Early diagnosis and prompt intervention are needed to prevent life-long complications and for a better prognosis [5].

We are presenting here a case of renal abscess managed with parenteral antibiotics and percutaneous aspiration.

CASE REPORT

A 3-year-old boy, the first child born out of non-consanguineous marriage, presented with fever for 2 days, intermittent severe abdominal pain for 1 day which was associated with two episodes of vomiting, and foul-smelling turbid urine with hematuria. He was treated at a local hospital in view of a urinary tract infection for 1 day with intravenous antibiotics since urine microscopic examinations showed plenty of pus cells and referred to our center in view of persisting severe abdominal pain.

At admission, the child was febrile with a high spiking fever (104F), blood pressure was normal and no edema or pallor was


present. The abdomen was soft and no mass palpable, however, he had right-sided renal angle tenderness. Past history was insignificant except for intussusception 3 months back treated with saline reduction and an episode of culture-negative urinary tract infection treated in a local hospital 1 year back.

The hematological evaluation showed a hemoglobin of 10.5 g%, white blood cell count of 21,100/ μ L with a polymorphic predominance (P85 L15), platelet counts of 1.63/ μ L, C-reactive protein (CRP) of 26 mg/dL, and erythrocyte sedimentation rate (ESR) of 55 mm/h. Renal function parameters were normal. Catheterized urine showed 10–15 pus cells/high power field (hpf) and RBC 1–2/hpf. The urine culture and sensitivity report, which was done outside on the 1st day of illness showed *Klebsiella* growth, so the patient was started on antibiotics according to the sensitivity reports (piperacillin and amikacin). All urine cultures and blood cultures done from our center were negative.

Ultrasound examination showed a right bulky hyperechoic kidney with mild perinephric fluid suggestive of pyelonephritis (on September 1, 2022). Repeat examination on day 7 of illness showed lobar nephronia of 1.6 cm \times 0.5 cm \times 1.2 cm in the subcapsular location in the mid-pole region of the right kidney. In view of persisting fever spikes, antibiotic upgraded and contrast-enhanced computed tomography (CECT) abdomen done on day 13 of illness showed a bulky right kidney with multiple intraparenchymal and subcapsular collections, largest measuring 3 cm \times 2.4 cm \times 3 cm (AP \times TR \times CC) in the subcapsular location in the mid-pole region of the right kidney suggesting early abscess formation in Fig. 1. In view of persistent fever, tigecycline, and cefoperazone/sulbactam was started on the 14th day of illness.

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Percutaneous ultrasound-guided aspiration of the abscess was done on the 15th day of illness, aspirated 10 mL purulent pus showed growth of *Escherichia coli* which was sensitive to piperacillin, amikacin, cefoperazone/sulbactam, meropenem, tigecycline, and gentamycin. Tuberculosis and fungal workup were negative.

The child responded well to drainage and antibiotic therapy and became afebrile on the 17th day of illness. Repeat CECT imaging on the 28th day of illness showed a reduction in renal size and abscess collection to 0.9 cm × 0.5 cm (Fig. 2). The immunoglobulin profile was normal. Intravenous antibiotic continued for 28 days, the child improved clinically very well and was discharged on the 44th day of illness.

DISCUSSION

Renal abscess is a rare clinical condition in children with unknown prevalence. A renal abscess is one of the most severe forms of renal parenchymal infection in children that may lead to renal loss or even death [3].

There is no unified approach in the literature for renal abscess management due to the lack of definitive data. The differential

diagnoses include acute lobar nephronia, acute pyelonephritis complicated by papillary necrosis, emphysematous pyelonephritis, malacoplakia, tuberculosis, or carcinomas. Although rare, renal cell carcinoma, or Wilms' tumor can have a similar presentation, so an adequate diagnostic workup is required [6].

According to the previous studies, the median age of children with renal abscess ranges from 15 months to 26 months [2]. No specific gender distribution is mentioned regarding renal abscesses in children as different studies show different results [2,7]. In the pediatric population, urological abnormality vesicoureteral reflux, ureteropelvic junction obstructions, calyceal diverticulum, and urolithiasis seem to be the most important predisposing risk factors for renal abscesses [3].

Clinical symptoms and signs were non-specific. The most common presentations are the clinical triad of high spiking fever for more than 1 week, abdominal pain/flank pain, and vomiting/nausea [3]. Our patient had all three symptoms. In a study of clinical assessment of children with renal abscesses presenting to the pediatric emergency department, fever was observed in all of them (100%) and 41.2% presented with prolonged fever for >7 days before diagnosis [1]. Other clinical features were reduced appetite, cachexia, urinary changes (including turbid urine, foamy urine, and gross hematuria), vomiting, bladder irritation, oliguria, puffiness, abdominal mass, abdominal tenderness, or cramps. In our child also, the fever lasted nearly 2 weeks and had associated urinary changes and cachexia.

In a previous study, more than 70% have leukocytosis and the patients have high CRP levels and ESR, whereas, procalcitonin was normal in most of them (90%) [2]. Similarly, in our child, leukocytosis was present with very high inflammatory markers and normal procalcitonin value along with normal renal function tests. Anemia was present in the initial period but during recovery, it got improved.

According to the previous studies, a renal abscess may result from hematogenous spread or ascending infections due to reflux or stasis of infected urine and the most common pathogens isolated in children are *E. coli* and *Staphylococcus aureus* [5,7]. In addition, anaerobic bacteria have also been reported to play an important role in pediatric renal abscesses [8]. Blood cultures were negative in most of the cases. These results may indicate that ascending infections from the urinary tract may play a more important role than the hematogenous spread in the development of renal abscesses in children. In our case also, the renal abscess culture report showed *E. coli* and the blood culture was sterile.

Ultrasound is particularly useful in the diagnosis of a pediatric renal abscess. However, CT has greater sensitivity and the best diagnostic accuracy for these lesions [6]. In addition, many experts still suggest that even when renal abscesses are identified by ultrasound, CT with contrast enhancement should be performed to distinguish between renal and perirenal abscesses [2,6]. In our case also, serial ultrasounds were done and the changes were reported but due to the clinical non-response, the patient went for CECT which diagnosed the formation of an early abscess.

In a renal abscess, early diagnosis and management are very important as it can cause significant mortality and sequelae.

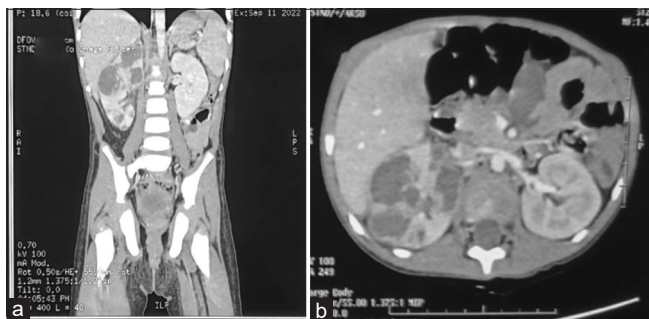


Figure 1: Contrast-enhanced computed tomography abdomen (a) coronal view (b) axial view showing acute pyelonephritis with multiple intraparenchymal and subcapsular collections with subtle peripheral enhancement, suggesting early abscess formation largest measuring 3 cm × 2.4 cm × 3 cm



Figure 2: Repeat contrast-enhanced computed tomography abdomen on day 28 of illness showing subcapsular residual abscess in lateral interpoler region with 0.9 cm × 0.5 cm

Most of the time, the patient needs a prolonged hospital stay. Intravenous administration of antibiotics which are sensitive to the pathogen is very crucial in the treatment. The previous data mostly grouped the renal abscess based on a diameter of 3 cm and recommended that renal abscesses larger than 3 cm can be treated with percutaneous abscess puncture, while those smaller than 3 cm can receive conservative anti-infective treatment [2,9]. We have done the percutaneous drainage before open surgery under ultrasound guidance in our case and he responded to it very well. Some authors support the conservative management up to a renal abscess size of 4 cm [6]. The main surgical method was percutaneous drainage guided by B-ultrasound and nephrectomy can be rarely performed for the selected non-functional kidneys.

CONCLUSION

Early diagnosis and management are very important in a renal abscess as it can cause significant mortality and sequelae. Most of the time, the patient needs a prolonged hospital stay. Intravenous administration of antibiotics which are sensitive to the pathogen is very crucial in treatment. Early diagnosis, treatment, and intervention can prevent complications such as the extension to the peritoneal cavity, skin, or chest and systemic complications. Conservative management can be provided in renal abscesses of size up to 4 cm size.

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