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**Lyh-Jyh Hao, Ray-Shyang Wang, Chien-Ta Chen, Shao-Wen Wu,
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Case Report: We present a 43-year-old female with a small renal abscess after incomplete treatment of acute pyelonephritis, which was associated with renal stone and *Escherichia coli* bacteremia. Patient was then treated with enough intravenous antibiotics without any classical surgical drainage, and came out to be fully healthy.

Conclusion: This case highlights the need for early identification of risk factors as well as the subtle feature of renal abscess by proper diagnosis and adequate treatment.

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CASE REPORT

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Keywords: Acute pyelonephritis, Antibiotics, Renal abscess, Renal stone

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INTRODUCTION

Renal and perirenal abscesses are uncommon diseases originated mainly from infections in or around the kidney. The former one is accounted for around 0.02% and the latter case is for about 0.2% of hospital admissions in Altemeier's series of 540 intra-abdominal abscesses [1]. A delay in renal abscess diagnosis may lead to higher morbidity and mortality, which has been reduced to 12% since the accessibility of computed tomography (CT) scan and magnetic resonance imaging (MRI) scan [2, 3]. Classical treatment for renal abscesses include surgical exploration, incision and drainage, or nephrectomy [4, 5]. In fact, simply invasive treatment appeared in early 1970s, and the trend towards conservative treatment is frequent due to the progress in imaging techniques and new antibiotics. Small renal abscesses could be effectively treated with the sufficient drainage and a course of intravenous antibiotics in the previous reports [4, 6–8]. Herein, we report a small renal abscess after incomplete treatment of acute pyelonephritis, which was completely restored to health by adequate antibiotic treatment.

CASE REPORT

A 43-year-old female, with left renal stone, presented to our hospital after two days of fever and left flank pain. The initial evaluation revealed high fever (body temperature 39.7°C), tachycardia (heart rate, 112 beats per minute), leukocytosis (white blood cell, 24,560 per micrometer) with a left shift of elevated C-reactive protein (18.98 mg/dL), and left flank tenderness, but no thrombocytopenia. There was no diabetes mellitus history of this female. However, bilateral calyceal renal stones and relative swelling of left kidney were noted on abdomen sonography. Moreover, the blood cultures yielded *Escherichia coli* and hematuria without pyuria were noted. Thus, left side acute pyelonephritis was impressed and intravenous antibiotics with cefazolin 1 g q8h and gentamycin 80 mg q12h were prescribed for 5 days. The patient requested discharge due to family problem when the fever was subsided for two days with follow-up white blood cell count 11690/ μ m and C-reactive protein 6.11 mg/dL.

Oral ciprofloxacin (250 mg tablet twice per day) was prescribed to her after discharge and she was informed to follow-up at our outpatient department (OPD) one week later. Unfortunately, chillness, low grade fever, left flank pain, leukocytosis (white blood cell, 15620/ μ m) and high C-reactive protein (13.39 mg/dL) recurred three days later after discharge. She was re-admitted to ward via OPD and followed-up abdomen sonography showing a 2.16 cm heterogenous hypoechoic nodule in lower pole of the left kidney, favor renal abscess (Figure 1). After admission, medical treatment without therapeutic drainage was suggested by infectious disease specialist and urologist. Intravenous antibiotics with ciprofloxacin 400 mg q12h and amikacin 250 mg q12h were prescribed for two weeks. Fever subsided and mild local left flank area knocking pain was noted. Normal white blood cell count (8540/ μ m) and mild elevated C-reactive protein (1.09 mg/dL) were noted. Follow-up abdomen computed tomographic scan revealed a 1-cm abscess in lower pole of the left kidney with focal perirenal fatty blurring, indicating that partial resolution of the left renal abscess was considered (Figure 2). She was then discharged and oral ciprofloxacin (250 mg tablet twice per day) was continuously prescribed for four more weeks at OPD, and follow-up abdomen sonography revealed less than 8 mm renal stone without any more abscess (Figure 3). Extracorporeal shock wave lithotripsy (ESWL) of left renal stone was suggested by the urologist, but the patient refused. She was instructed to drink eight glasses of fluid daily to maintain adequate hydration and to decrease the chance of urinary supersaturation with stone-forming salts. Other dietary guidelines were suggested to avoid excessive salt and protein intake and moderation of calcium and oxalate intake. There was no more pyelonephritis or renal abscess recurrence of this patient three years later after discharge.

Figure 1: Sonography illustrating the 2.16 cm heterogenous hypoechoic nodule in lower pole of the left kidney in the female patient. Area surrounded by arrowheads and yellow cross signs indicating the renal abscess.

Figure 2: Follow-up abdomen computed tomography scan revealed the 1 cm abscess in lower pole of the left kidney with focal perirenal fatty blurring after intravenous antibiotics with ciprofloxacin and unikin treatments for two weeks in the female patient. Area pointed by arrowheads indicating the reduced renal abscess.

DISCUSSION

The diagnosis of perinephric or renal abscess, as well as splenic abscess, is frequently delayed, and the mortality rate in some cases is extensive. Thus, perinephric and renal abscesses should be seriously taken care when a patient presents with symptoms of pyelonephritis and remains feverish after four or five days of treatment [1]. Besides, diagnoses should be entertained when a urine

Figure 3: Oral ciprofloxacin was continuously prescribed for four more weeks, and follow-up abdomen sonography revealed renal stones (less than 8 mm) without any more abscess in lower pole of the left kidney. Pyelonephritis recurrence of the patient did not occur after discharge.

culture yields a polymicrobial flora; a patient is known to have renal stones; or fever and pyuria coexist with a sterile urine culture. Meanwhile, renal ultrasonography and abdominal CT should be exploited to confirm the authentic cause.

Report has suggested an algorithmic approach to manage renal abscesses, which illustrated that main management with antibiotics was recommended in <3 cm in diameter small abscesses, and drainage (percutaneous or surgical) was recommended in >5 cm large abscesses. Both approaches could be applied in medium-sized abscesses (3–5 cm) [6]. Another report further suggested avoiding the aggressive treatment on renal and perinephric abscesses with 5 cm in diameter or less, which could have complete decrease after antibiotic therapy [9]. However, study also illustrated that aggressive drainage is suitable in abscesses >3 cm [6]. In fact, additional study has demonstrated that percutaneous abscess drainage might have several complications [10].

The total duration of antibiotic treatment course is dependent on the patient's clinical response. The current recommendations are to continue parenteral antimicrobial therapy for at least one to two days after clinical improvement, and oral antibiotic therapy can then be administered for an additional two weeks [11]. In previous several studies, renal stones and urinary obstruction have been reported as common predisposed conditions with an incidence of 24–54% and 21–50% of renal abscess, respectively [12, 13]. More than 75% of perinephric and renal abscesses arise from a urinary tract infection, which ascends from the bladder to the kidney with pyelonephritis occurring prior to abscess development [1]. *E. coli*, *Proteus* spp., and *Klebsiella* spp. are the organisms most frequently encountered in perinephric and renal abscesses [1]. Patients with renal

abscesses have a higher rate of *E. coli* infection in urine cultures, and a female predominance (91.8%) could be observed [4]. This may be a result of the development of renal abscesses via an ascending infection by organisms already isolated within the urinary tract [7].

The intravenous antimicrobial therapy may be a good alternative treatment if therapeutic drainage is believed to have considerable risk. Large abscesses, obstructive uropathy, severe vesicoureteral reflux, diabetes, old age, and urosepsis with gas forming organisms are the factors associated with antimicrobial treatment failure [2]. Percutaneous nephrostomy should be considered when there is a large abscess or obstructive uropathy, and no clinical improvement occurs after 48 to 72 hours of appropriate antibiotic therapy [2]. An incision and drainage is preferred when the open drainage is required. Nephrectomy is reserved for patients whose renal parenchyma is diffusely damaged and for elderly patients whose survival depends upon urgent surgical intervention [7].

Renal stone is an important risk factor for our case and incomplete intravenous antibiotics treatment course of acute pyelonephritis resulted in the renal abscess formation. In fact, medium-sized as well as small-sized renal abscesses can be treated successfully with adequate IV antibiotics without surgical drainage [4]. Empirical therapy with broad-spectrum antibiotics (ampicillin or vancomycin in combination with an aminoglycoside or third-generation cephalosporin or a fluoroquinolone) is usually recommended because it is often very difficult to identify the correct causative organisms from the urine or blood. Percutaneous drainage under CT or ultrasound guidance is indicated if the patient does not respond within 48 hours of treatment [6]. The drained fluid should be cultured for the causative organisms. The total duration of the treatment was conditioned by the clinical response and is about one to two months in most patients. The healing of the abscess assessment criteria include absence of pain, reduction of fever, normalization of ESR or CRP, disappearance of the abscess on ultrasound or CT scan which usually reveals a cortical scar. The best indicator of healing is the absence of recurrence of clinical signs and infection symptoms. If the clinical and laboratory parameters come within normal limits, then the antibiotic treatment can be stopped 10 days later. The patient must be followed up over an interval of two weeks, two or three months after the end of the treatment [14]. Asymptomatic renal stones may be followed conservatively. However, patients can be advised that about 50% of small renal calculi become symptomatic within five years [15]. Some surgical procedures may be required for larger stones (i.e., ≥ 7 mm) that are unlikely to pass spontaneously. In some cases, hospitalizing a patient with a large stone to facilitate surgical stone intervention is reasonable. However, acute renal colic mostly can be treated on an ambulatory care [16]. General treatment of renal stones is with hydration to increase urine output and with analgesia. Renal calculi less than

2 cm in size can generally be treated with extra corporeal shock wave lithotripsy (ESWL) [17]. After passage of the stones, treatment is directed at prevention of recurrent stones formation. The foundation of renal stones therapy is maintenance of high urine output (2–3 L/day) with oral hydration and a low-salt diet (<2 g/day) [18].

CONCLUSION

This case report is an example of a small renal abscess after incomplete treatment of acute pyelonephritis which was associated with renal stone and *E. coli* bacteremia. Several reports observed that small renal abscesses were effectively treated with a course of intravenous antibiotics. The total duration of the treatment was conditioned by the clinical response. This case highlights the need for early identification of risk factors as well as the subtle features of renal abscess for appropriate diagnosis and adequate treatment.

Author Contributions

Lyh-Jyh Hao – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Ray-Shyang Wang – Substantial contributions to conception and design, Analysis and interpretation of data, Drafting the article, Final approval of the version to be published

Chien-Ta Chen – Acquisition of data, Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Shao-Wen Wu – Acquisition of data, Analysis and interpretation of data, Drafting the article, Final approval of the version to be published

Wei-Jen Yao – Acquisition of data, Analysis and interpretation of data, Drafting the article, Final approval of the version to be published

Ming-Jui Wu – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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