Case Report

Retroperitoneal emphysema caused by a renal abscess: a case report

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Abstract: We report a case of retroperitoneal emphysema caused by a renal abscess. A 45-year-old man with underlying type 2 diabetes mellitus visited the emergency department with right flank pain and a fever. On physical examination, right costovertebral tenderness in the ipsilateral flank was noted. Leukocytosis and high inflammatory marker levels were observed. Urinalysis showed pyuria and glucosuria. Urine culture was positive for Streptococcus agalactiae. A computed tomography scan of the abdomen showed a focal, low-attenuation lesion in the right kidney with a 3 cm, exophytic, high-attenuation lesion in the right kidney upper pole and gas-containing fluid collection within the retroperitoneal space. The diagnosis was retroperitoneal emphysema caused by a renal abscess. As the vital signs were stable and the patient refused puncture, we decided on a course of antibiotics alone with follow-up without percutaneous drainage or surgery. The patient improved without any complications. This is a rare case of a renal abscess penetrating the renal fascia and progressing to a posterior paranephric emphysema. The patient was treated with antibiotics alone and cured successfully. Early diagnosis and proper treatment are needed, and percutaneous drainage or urgent surgery would be beneficial for such cases depending on the patient's condition.

Keywords: Renal abscess; retroperitoneal emphysema; case report

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Introduction

Renal and perinephric abscesses are uncommon but severe lesions caused predominantly by urinary tract infections (1,2). The incidence of renal and perinephric abscesses ranges from 1 to 10 cases per 100,000 hospitalizations (3). Ten percent of all renal cortical abscesses rupture through the renal capsule, forming a perinephric abscess (3). Retroperitoneal emphysema is a pathological situation with an abnormal amount of air in the retroperitoneal tissue (4). The most common causes of this condition are surgical complications (5). We report a case of retroperitoneal emphysema caused by a renal abscess. We present the following case in accordance with the CARE reporting checklist (available at https://apm.amegroups.com/article/view/10.21037/apm-21-524/rc) (6).

Case presentation

A 45-year-old man visited the emergency department with right flank pain and fever. He was under medication for type 2 diabetes mellitus (DM) since 7 months ago. He was diagnosed with myocardial infarction by coronary angiography, which was treated with percutaneous coronary intervention 10 years previously. In addition, he was diagnosed with rotator cuff tear of the right shoulder 7 months ago, which was when the type 2 DM was detected. At the time of admission, his blood pressure was 100/60 mmHg, heart rate was 86 beats/min, respiratory rate was 20 breaths/min, and body temperature was 38.0 ℃. The abdomen was soft, and bowel sounds were normoactive. Right costovertebral tenderness in the ipsilateral flank was noted. On the day of admission, his laboratory results were as

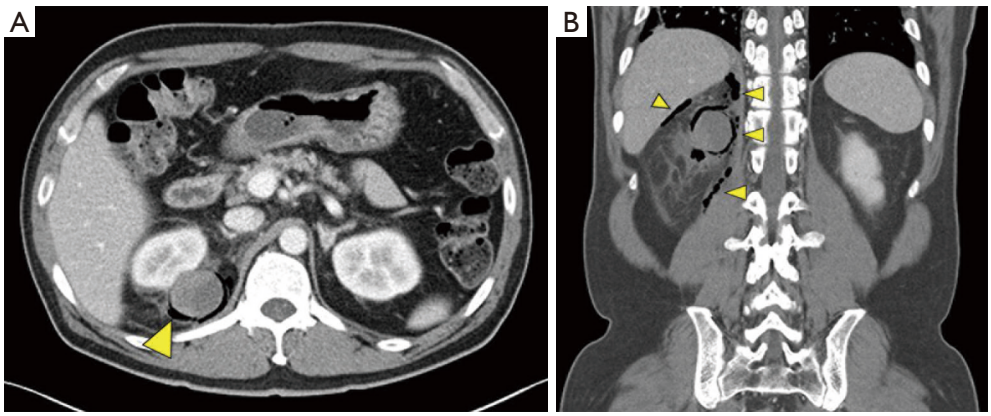

Figure 1 Abdominal CT scan showed focal low attenuation lesion in the right kidney with about 3 cm exophytic high attenuated lesion in the right kidney upper pole (yellow arrow) (A). Gas-containing fluid collection within the retroperitoneal space was revealed (yellow arrows) (B). CT, computed tomography.

follows: white blood cell count, 13,000/μL (4,000–8,000/μL); hemoglobin, 14.1 g/dL (12–18 g/dL); blood urea nitrogen, 17.0 mg/dL (8–23 mg/dL); serum creatinine, 0.71 mg/dL (0.5–1.3 mg/dL); C-reactive protein, 37.45 mg/dL (0–0.3 mg/dL); lactate, 1.88 mmol/L (0.5–2.2 mmol/L); and procalcitonin, 6.21 ng/mL (0–0.5 ng/mL). The fasting and postprandial glucose levels were 125 and 195 mg/dL, respectively. Hemoglobin A1c level was 9.2%. Urinalysis showed pyuria and glucosuria. Urine culture was positive for *Streptococcus agalactiae*. A computed tomography (CT) scan of the abdomen showed a focal, low-attenuation lesion in the right kidney with a 3-cm, exophytic, high-attenuation lesion in the right kidney upper pole and gas-containing fluid collection within the retroperitoneal space (*Figure 1*). The diagnosis was retroperitoneal emphysema caused by a renal abscess. The radiological classification was type 2 (renal or perirenal fluid accompanied by a bubbly gas pattern or gas in the collecting system) and class 3a (extension of gas or abscess to the perinephric space). A day before hospitalization, intravascular ciprofloxacin and metronidazole were administered at a private clinic. We changed the treatment to intravascular piperacillin-tazobactam. We also considered performing puncture, but the patient refused. Since the patient's vital sign was stable and the pathogen was identified through the urine culture, we decided only to follow-up the patient while on antibiotics. The patient developed a fever again after 14 days of hospitalization. Since the follow-up CT showed improved retroperitoneal emphysema and renal abscess, we changed the antibiotics to intravascular meropenem and intravascular metronidazole instead of considering surgical treatment. After 2 weeks of antibiotic use, the patient showed clinical improvement and was discharged. Two weeks after discharge, the follow-up CT showed that the renal abscess had decreased (Figure S1). We decided to conduct the follow-up using CT scans without additional antibiotic therapy. A month later, the follow-up CT confirmed that renal abscess had decreased from 3 to 2.5 cm, and the retroperitoneal emphysema was completely resolved (*Figure 2*). The timeline of patient's clinical course is detailed in *Figure 3*. The patient has doing well without any complications during the 6-momth follow-up period, so we plan to take a follow-up CT after 1 year.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

Discussion

We present a case of retroperitoneal emphysema caused by a renal abscess. The patient was treated with antibiotics alone and cured successfully. More than 75% of renal and perinephric abscesses arise from urinary tract infections (7). The kidneys are surrounded by a layer of perirenal fat that is in turn surrounded by the renal fascia (8). It is rare for a renal abscess to penetrate the renal fascia and progress to posterior paranephric emphysema.

The predisposing factors of renal and perinephric

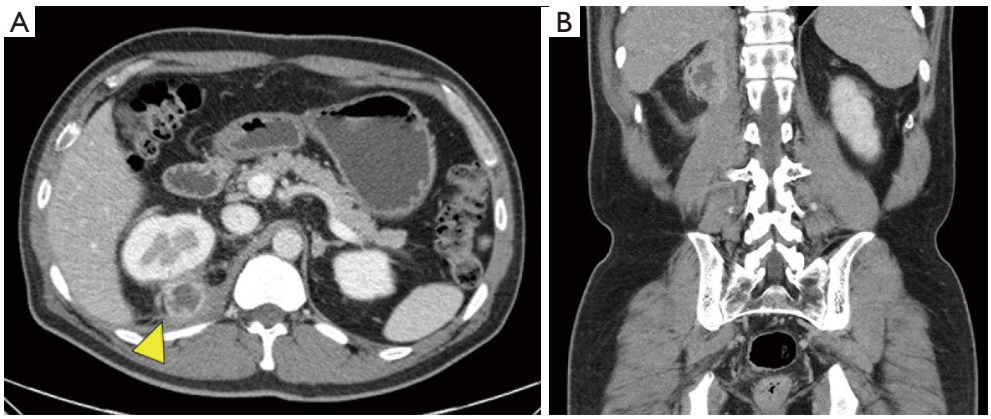

Figure 2 After a total of 4 weeks of antibiotics treatment, follow-up CT scan performed 6 weeks later showed that renal abscess had decreased from 4 to 2.5 cm (yellow arrow) (A). Retroperitoneal emphysema was totally resolved (B). CT, computed tomography.

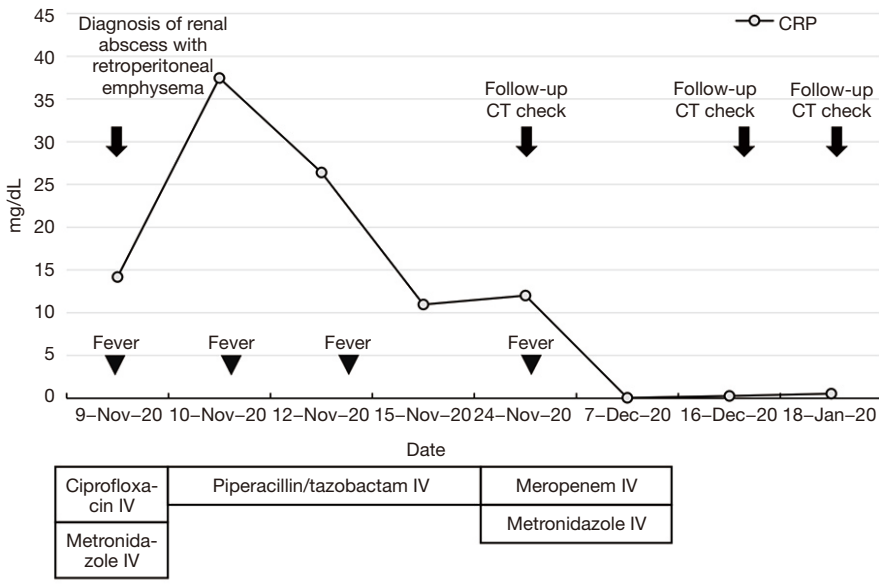

Figure 3 Timeline of patient's clinical course. CRP, C-reactive protein; IV, intravenous; CT, computed tomography.

abscesses are previous urinary tract infections, renal or ureteric calculi, DM, and chronic kidney disease (9,10). The most common organisms in renal and perinephric abscesses are *Escherichia coli*, *Proteus* species, and *Klebsiella* species (7). As the symptoms of renal and perinephric abscess are non-specific, careful history-taking and physical examination are essential. Fever with chills and general weakness are common symptoms. Flank pain and abdominal pain are also common, and pain may be referred to the groin or leg (7,9). Renal ultrasonography and CT scan are the diagnostic methods of choice (11).

Up to 95% of the emphysematous pyelonephritis cases have underlying DM (12,13). If patients have underlying DM and complaints of fever or flank pain, early diagnosis is needed to evaluate emphysematous pyelonephritis. The choice of antibiotics should consider the local sensitivity patterns of the infecting organism. Fluoroquinolone is one of the empirical choices, but when local resistance to fluoroquinolone is high or the patient is severely ill, agents such as piperacillin-tazobactam, ceftolozane-

tazobactam, and imipenem may also be considered (14,15). Renal abscesses and emphysemas often require not only antibiotics but also percutaneous drainage or surgery (16). For localized emphysematous pyelonephritis, percutaneous drainage combined with antibiotics can provide better outcome. Patients with emphysematous or xanthogranulomatous pyelonephritis may require surgical excision, and nephrectomy is also commonly performed (17). Our patient improved with only antibiotic treatment due to rapid diagnosis and proper antibiotics treatment.

In conclusion, retroperitoneal emphysema is a rare complication of a renal abscess. Owing to non-specific signs and symptoms, the diagnosis may be delayed. We suggest that if patients have underlying DM, complaints of fever or flank pain, and sustained symptoms after initiation of antibiotic therapy, careful physical examination and imaging diagnostic tests are important. Proper antibiotic treatment is needed, and percutaneous drainage or urgent surgery would be beneficial depending on the patient's condition.

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Footnote

Reporting Checklist: The authors have completed the CARE reporting checklist. Available at https://apm.amegroups.com/article/view/10.21037/apm-21-524/rc

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://apm.amegroups.com/article/view/10.21037/apm-21-524/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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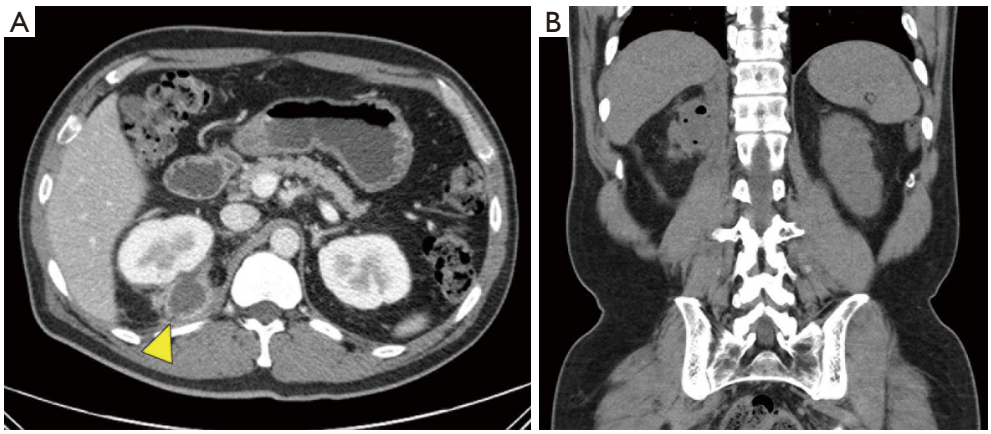

Figure S1 After a total of 4 weeks of antibiotics treatment, follow-up CT scan performed 2 weeks later showed that renal abscess had decreased (yellow arrow) (A). Retroperitoneal emphysema was also decreased (B).

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