A Case of Renal Abscess Mimicking Metastatic Lesion in a Patient with Lung Carcinosarcoma

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Renal abscesses require prompt diagnosis and appropriate intervention, as they can be life-threatening. However, diagnosis based solely on clinical findings is often challenging. We present the case of a 69year-old woman with left renal masses on follow-up computed tomography (CT) after surgery for pT2aN0M0 lung carcinosarcoma. The masses were localized only in the left kidney without suspected metastatic lesions at other sites. The patient was referred to our department for further evaluation and treatment under a diagnosis of suspected metastatic lung carcinosarcoma of the left kidney. On enhanced CT, the left renal masses, the largest of which had a diameter of 40×36 mm had thick irregular walls gradually enhanced by the contrast media and an internal low-attenuation area. The masses showed heterogeneous signal intensity with a pseudocapsule on T2-weighted magnetic resonance imaging. Clinical symptoms such as fever or costovertebral angle tenderness were absent, and blood and urine tests were not sufficiently inflammatory to suggest a renal abscess. Histopathological findings on CT-guided renal biopsy revealed only inflammatory tissue and no tumor cells. However, because lung carcinosarcoma metastatic nodules could not be ruled out, laparoscopic left nephrectomy was performed for a definitive diagnosis and curative intent. The pathological diagnosis was renal abscess without malignant lesions. Here, we present a case of renal abscess mimicking metastatic lesions in a patient with lung carcinosarcoma. Accurately differentiating renal abscesses from metastatic renal tumors before treatment is often difficult. Renal abscess diagnosis should be considered through a comprehensive evaluation of the clinical findings of individual cases. (J Nippon Med Sch 2024; 91: 590-594)

Key words: renal abscess, small renal mass, CT-guided renal biopsy

Introduction

A renal abscess is a rare complication of kidney bacterial infection¹. The risk factors for renal abscesses include diabetes mellitus, renal calculi, recurrent urinary tract infections, and vesicoureteral reflux². Acute focal bacterial nephritis is considered a pre-lesion, and it is important to evaluate the presence of an antecedent infection and concomitant symptoms such as fever, chills, and back pain². Renal abscesses show a variety of imaging findings that can be difficult to distinguish from the features of malig-

nant tumors because both diseases involve inflammation and necrosis¹. The treatment of renal abscesses is challenging and requires prompt diagnosis and appropriate interventions because the condition can be fatal. Here, we report a case of renal abscess that was difficult to differentiate from renal metastasis of lung carcinosarcoma.

Case Report

A 69-year-old woman underwent a right wedge resection for lung malignancy, conducted by the lung surgery team

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https://doi.org/10.1272/jnms.JNMS.2024_91-609

Journal Website (https://www.nms.ac.jp/sh/jnms/)



Fig. 1 Abdominal dynamic computed tomography revealed a low-density area inside the mass, and the margin was slowly enhanced. (a: pre-contrast phase, b: arterial phase, c: nephrographic phase)



Fig. 2 Contrast-enhanced T1-weighted image showed low intensity inside the mass (a). T2-weighted MRI showed heterogeneous signal intensity in inner part of the mass and a slightly high intensity in the wall of the mass compared to the renal parenchyma (b), which showed a high intensity on diffusion-weighted images (c). (a: contrast-enhanced T1-weighted image, b: T2-weighted image, c: diffusion-weighted image)

at our hospital. The tumor was located in the right upper lobe of the lung and was situated 1.0 cm from the pleura. Pathological findings revealed carcinosarcoma, classified as pT2aN0, G4, and pl1. The Ki-67 labeling index was 10-40%. One month after the surgery, a computed tomography (CT) scan revealed a mass in the left kidney, suggesting renal metastasis of the lung carcinosarcoma. The mass could not be definitively identified on the CT scan taken one month prior to the surgery. The patient was referred to our department for further examination and treatment of a mass that was localized only to the left kidney, without suspected metastatic lesions at other sites. On initial examination, her temperature was 36.8°C, and there was no costovertebral angle tenderness. Her laboratory data were as follows: blood white blood cell count 4,900/uL, serum c-reactive protein level 8.74 mg/ dL, and leukocytes in urine sediment 30-49 /HPF. Noncontrast CT imaging showed an irregular mass (40×36 mm) in the upper pole of the left kidney (Fig. 1a). On contrast-enhanced CT, the left renal masses had a thick irregular wall that was gradually enhanced and an internal low-attenuation area. (Fig. 1b and c). Contrastenhanced magnetic resonance imaging (MRI) showed masses with a poor central enhancement, and the mass had the thick wall with contrast enhancement suggesting a pseudocapsule (Fig. 2a). T2-weighted MRI showed heterogeneous signal intensity of the mass with a pseudocapsule that shows slightly high signal intensity compared to renal parenchyma (Fig. 2b). The central part of the mass showed a high signal on diffusion-weighted images (DWI), and the apparent diffusion coefficient (ADC) was low, indicating restricted diffusion. The thick wall shows mild to moderate high signal on DWI (Fig. 2c).

We considered the possibility of a renal abscess based



Fig. 3 The renal mass consisted of thick dissepiment and abscess. Macroscopically the border between the abscess and the renal parenchyma was clear (white arrows).

on radiological findings and blood and urine test results. However, our patient had no history of previous infection but had high-grade lung carcinosarcoma; thus, lung carcinosarcoma renal metastasis could not be completely ruled out. A CT-guided renal biopsy was performed using an 18-gauge needle, and two cores were collected. Due to insufficient sample collection, we could not conduct the culture test. The histopathological findings revealed only inflammatory changes. Based on these medical findings, following a thorough discussion with the patient and the attending physician of the lung surgery team, a laparoscopic left nephrectomy was performed for definitive diagnosis and treatment. Macroscopic findings of the excised specimen revealed well-defined masses in the renal parenchyma (Fig. 3). Culture tests revealed Escherichia coli 3+ in the fluid of the renal mass obtained through nephrectomy. The histopathological diagnosis was renal abscess with inflammatory changes spreading to the surrounding renal parenchyma and fatty tissue, and no malignant cells were found. Perioperative complications were not observed, and the patient was discharged on the 5^{th} postoperative day.

Discussion

We report a case of renal abscess that was difficult to differentiate from renal metastasis of a lung carcinosarcoma. Renal abscesses are encapsulated lesions in the renal parenchyma filled with infectious fluid², that can be life threatening and require prompt diagnosis and appropriate interventions³. Renal abscesses often arise as a complication of urinary tract infections or as a result of hematogenous seeding from other infected sites²⁴. The disease is usually insidious and presents with a variety of symptoms including fever, abdominal pain, fatigue, chills, nausea, loss of appetite, and weight loss². The presence of a pre-existing infection is a crucial factor in achieving a definitive diagnosis of renal abscess. Nevertheless, renal abscesses often remain asymptomatic, posing a challenge to accurate diagnosis. In the reported case, blood and urine tests indicated a slightly infective condition; however, there were no previous infectious diseases or urinary tract abnormalities such as hydronephrosis, which led to an inaccurate initial diagnosis. Therefore, clinicians should recognize renal abscesses as a possible diagnosis, even in the absence of significant pre-existing infection.

Radiological evaluation is a crucial tool for the differential diagnosis of renal masses5. The characteristic findings of renal abscesses are that the boundary between the abscess and the renal parenchyma is unclear, and that the internal contrast effect on CT imaging is poor. The central part of the abscess show hyperintensity on the T2weighted image and DWI⁴. When a renal abscess grows, it appears ring-shaped with irregular walls, and the septal wall within the abscess is clearly visible on MRI⁴. Renal metastases typically appear as multiple foci or endophytic growths in CT images6. They exhibit isodense or low attenuation characteristics when compared to the surrounding renal tissue, and they show only marginal enhancement after contrast administration (Table 1)7-9. Additionally, metastatic tumors tend to exhibit hyperintensity on DWI due to their high cell or nuclear density. Conversely, cystic degeneration or necrosis within metastatic tumors tends to demonstrate low to moderate signal intensity on DWI and moderate to high signal intensity on ADC map. Renal metastases are rare, and the primary tumors of origin are diverse (the most common primary tumors associated with renal metastasis are lung cancers, followed by colorectal, head and neck, breast, soft tissue, and thyroid cancers)¹⁰. Furthermore, it has been suggested that the form and rate of renal metastasis differ depending on the localization of lung cancer¹¹. The appearance of metastatic renal lesions in images obtained through dynamic CT or MRI depends on the characteristics of the primary tumor. Particularly, images of abscesses and central necrosis in high-grade tumors can be very similar and sometimes indistinguishable, necessitating further evidence to establish a definitive diagnosis.

Renal biopsy has been proposed as a diagnostic procedure for characterizing small renal masses. The Japanese guideline recommends renal biopsy in cases where a deTable 1 Comparison of clinical findings/images

Clinical findings/images	Renal abscess	Metastases to the kidney
Key features for diagnosis	The presence of pre-infection is the most important factor, which is leading to defini- tive diagnosis. The symptoms of remark- able infection are not often existed in some patients.	The primary malignant tumor exists in other organs of the body, however, metastases to the kidney are a rare entity.
СТ	An abscess appears as an irregular mass of low attenuation with a thick wall or pseudo capsule, which can be visualized on con- trast enhanced CT scans.	CT images for renal metastasis show multi- focal, endophytic, and low- to iso-attenua- tion compared with renal parenchyma, and only slightly enhancement with contrast.
MRI	The central part of the abscess shows high signal intensity on T2WI and no enhancing effect on contrast-enhanced T1WI. DWI shows diffusion restriction due to pus; hy- perintense on DWI and hypointense on ADC map. When a renal abscess grows, MRI findings show the septal wall within the abscess is visible.	In general, metastatic tumors typically exhibit high signal intensity on DWI due to their high nuclear density. Conversely, cystic degeneration or necrosis within metastatic tumors tends to demonstrate low to moderate signal intensity on DWI and moderate to high signal intensity on ADC map. The metastatic renal lesions obtained through MRI are influenced by the characteristics of the primary tumor.

CT: Computed Tomography, MRI: Magnetic Resonance Imaging, T1WI: T1-weighted Image, T2WI: T2-weighted Image, DWI: Diffusion-weighted Image, ADC: Apparent Diffusion Coefficient

finitive diagnosis cannot be obtained based on clinical findings. Recent studies have reported success rates of \geq 80% on percutaneous needle core biopsy for small renal masses^{12,13}. However, renal biopsy is not actively recommended in cases in which it is difficult to puncture solid components, such as cystic renal masses, because of the potential for false negatives caused by sampling error¹³⁻¹⁵. In the reported case, we performed CT-guided needle biopsy of the cystic renal mass to confirm whether the lesion was a metastatic pulmonary carcinosarcoma or an abscess. The biopsy result was negative for malignancy; however, we could not completely rule out the possibility that the cystic renal mass was a rapidly progressing renal metastasis (false negative biopsy results). Finally, we decided to perform nephrectomy for surgical complete response as a viable option for both diagnosis and treatment. Still, it's worth considering the option of re-evaluating through short-term imaging and assessing the response to antibiotics therapy. Therefore, clinicians need to manage cystic renal masses using rapid and accurate diagnostic techniques through various diagnostic methods.

In conclusion, we encountered a case of renal abscess mimicking a metastatic lesion in a patient with lung carcinosarcoma. Clinicians need to comprehensively evaluate the clinical findings and multiple radiological images to accurately diagnose a renal mass with central hypodense areas as renal abscess or as renal metastasis. Short-term re-imaging and observation of the response to antimicrobial drug treatment may help avoid unnecessary invasive procedures.

Conflict of Interest: We have no conflict of interest to disclose.

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(Received, June 20, 2023)

(Accepted, October 25, 2023)

(J-STAGE Advance Publication, December 8, 2023)

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