Balkan Med J 2016;33:701-5

Multimodality Imaging Findings of a Renal Aspergilloma

Mesut Bulakçı[1], Merve Gülbiz Kartal[1], Erhan Çelenk[1], Sena Tunçer[1], Işın Kılıçaslan[2]

[1]Department of Radiology, İstanbul University School of Medicine, İstanbul, Turkey
[2]Department of Pathology, İstanbul University School of Medicine, İstanbul, Turkey

Background: Renal aspergillosis is a rare infection that usually occurs in persons with a predisposition for this condition. Its differential diagnosis includes primary and metastatic renal malignancies, pyelonephritis and secondary abscess formation, granulomatous disorders, and renal infarction. We aim to stress the role of multimodality imaging and percutaneous biopsy in the diagnosis of this condition.

Case Report: We present diffusion weighted imaging (DWI) and positron emission tomography-computed tomography (PET-CT) findings in addition to conventional imaging modalities in a 55-year-old man with secondary renal aspergilloma.

Conclusion: Radiological imaging methods are an integral part of diagnostic workup for renal aspergillosis. A definitive diagnosis is made by histopathological and/or microbiological examination of the material obtained via percutaneous biopsy under guidance of imaging methods.

Keywords: Renal aspergilloma, US, CT, MRI, PET/CT, biopsy

Aspergillosis is a general term referring to opportunistic infections caused by fungi of the genus aspergillus. Infections associated with aspergillus species have generally been reported to occur in immunocompromised persons. Renal involvement is rare, usually occurring secondary to primary or hematogenous spread (1).

Renal aspergilloma can be detected with ultrasonography (US), computed tomography (CT), and magnetic resonance imaging (MRI) (1,2). Definitive diagnosis, however, requires histopathological or microbiological examination of biopsy material obtained under the guidance of US or CT (1,2). Here, we presented the findings of US, CT, and MRI with contrast in a case with solitary renal aspergilloma. We also aimed to demonstrate diffusion weighted imaging (DWI) and positron emission tomography-computed tomography (PET-CT) findings in this condition for the first time in the literature, to our knowledge.

CASE PRESENTATION

A 55-year-old man presented to our hospital with nausea, vomiting, and loss of 8 kg weight in 1.5 months. Twelve years before, he had been diagnosed with follicular lymphoma for which he had received CHOP chemotherapy; he had also undergone an autologous bone marrow transplantation 10 years previously. He had a history of fungal infection in the periorbital region and lungs.

The patient underwent a follow-up PET-CT for Non-Hodgkin's lymphoma (NHL), which revealed fluorodeoxyglucose (FDG) uptake anterior to the masseter muscle, in the anterior chest wall, medial segment of the middle lobe of the right lung, left gluteal region, and inferior pole of the left kidney (Figure 1). A thoracic CT (Aquilion 64, Toshiba Medical Systems; Otawara-shi, Japan) obtained later when there was difficulty breathing showed thick-walled cavitary lesions, with the largest reaching 5.5 cm in diameter. There were also cylindrical areas of bronchiectasis neighboring a cavitary lesion with a size of 56x27 mm in the anterior segment of the upper lobe of the right lung (Figure 1). Aspergillus fumigatus proliferation was shown in a fine needle aspiration sample obtained from the lung lesion. Abdominal CT demonstrated a smooth contoured mass lesion in the inferior pole of the left kidney, which was iso-hypodense to renal parenchyma and showed exophytic extension. There was no marked inflammation or fluid collection in perirenal fatty tissue (Figure 1).

Address for Correspondence: Dr. Mesut Bulakçı, Department of Radiology, İstanbul University School of Medicine, İstanbul, Turkey
Phone: +90 533 314 00 37 e-mail: mesutbulakci@yahoo.com
Received: 3 July 2015 Accepted: 10 September 2015 • DOI: 10.5152/balkanmedj.2016.15880
Available at www.balkanmedicaljournal.org

Cite this article as:
Bulakçı M, Gülbiz Kartal M, Çelenk E, Tunçer S, Kılıçaslan I. Multimodality imaging findings of a renal aspergilloma. Balkan Med J 2016;33:701-5

Sonographic examination of the patient was performed with a Siemens Sonoline Antares machine (Siemens Healthcare; Malvern, PA). Abdominal US revealed an exophytic, heterogeneously iso-hyperechoic mass lesion with a size of 37x34 mm at the level of inferior pole in the left kidney. Color Doppler US image of the same lesion shows no blood flow signal within the mass (Figure 2). In a subsequent abdominal MRI examination (Magnetom Symphony, Siemens Medical Solutions; Erlangen, Germany), this lesion appeared heterogeneously hyperintense on T2W images and hypointense on T1W images. DWI images and apparent diffusion coefficient (ADC) mapping revealed a marked limitation of diffusion in the lesion. Post-contrast images showed a mass lesion with irregular borders, exophytic extension, and peripheral contrast uptake, which was consistent with a malignant formation (Figure 3).

An ultrasonography-guided fine needle aspiration was carried out from the mass in the left kidney. The pathology findings were compatible with a renal aspergilloma (Figure 4). As the lesion content was too dense, it was deemed unsuitable for percutaneous drainage. Thus, complete resection of the lesion was achieved by partial nephrectomy. The histopathological examination of the partial nephrectomy material was compatible with renal aspergilloma. The patient's informed consent was obtained for the release of his medical information.

DISCUSSION

While different aspergillus species can infect humans, aspergillus fumigatus is the most commonly encountered aspergillus species in clinical practice. As a saphrophytic species found in the natural environment, this fungus species is prevalent on a global scale but it only infects persons with certain predisposing conditions, including diabetes, chronic alcoholism, tuberculosis, and intravenous drug abuse (3). Literature data suggest that it affects transplant patients, acquired immune deficiency syndrome (AIDS) victims, persons with hematological malignancies, and recipients of chemotherapy and corticosteroid therapy to a greater extent (3,4).

FIG. 1. a-c. An irregular thick-walled cavitary lesion and localized bronchiectasis is seen in the upper lobe of the right lung on a CT image with lung window (a), a well-defined renal mass with low density is seen on axial CT image (arrow) (b), a fused PET-CT image obtained from upper abdomen reveals a renal lesion with increased peripheral FDG uptake (c).

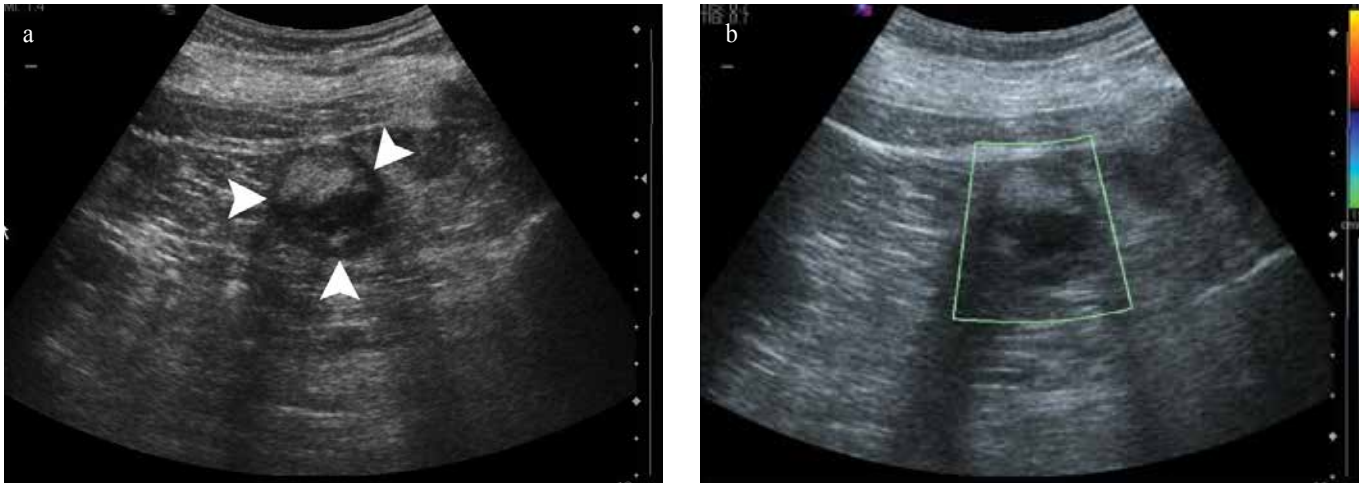

FIG. 2. a, b. An axial abdominal ultrasound image shows an exophytic renal lesion with heterogeneous echotexture (arrowheads) (a), color Doppler US image of the lesion (b).

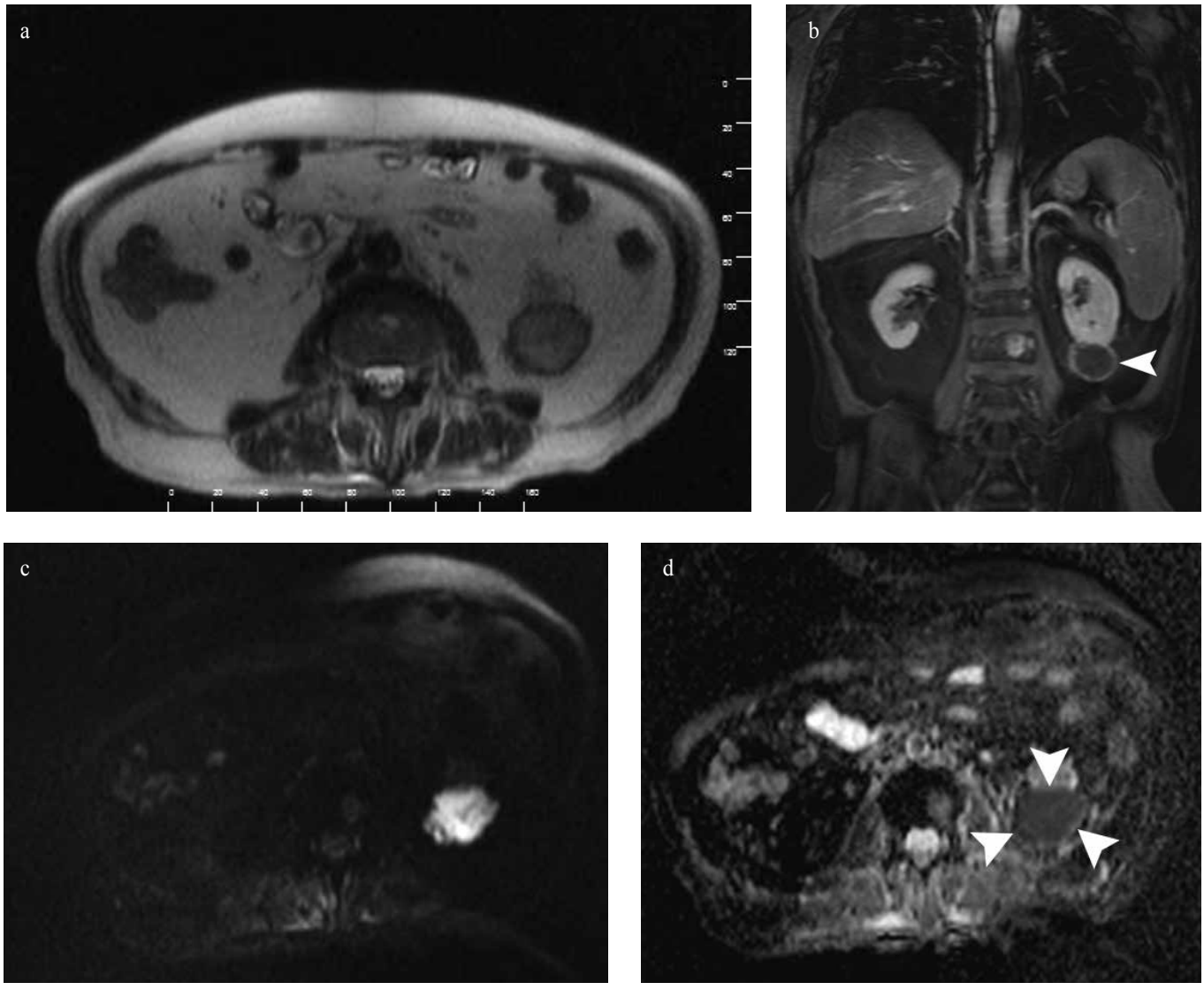

FIG. 3. a-d. A homogeneously hyperintense renal lesion with hypointense rim is seen on an axial T2-weighted MR image (a), a contrast-enhanced coronal T1-weighted image demonstrates an exophytic well-defined mass with peripheral enhancement in the lower pole of the left kidney (arrow) (b), diffusion-weighted MR images obtained with b values of 1000 sec/mm^2 and corresponding ADC map show marked restriction of diffusion entire the mass (arrowheads) (c-d).

Aspergillosis may affect many organs although lungs are the most commonly involved organs. Renal involvement, on the other hand, is quite rare (3). While it is highly difficult to determine the mechanism of occurrence of primary renal aspergilloma, secondary involvement usually takes place by hematogenous spread from a pulmonary focus (1). We also believe that the renal involvement of our case occurred secondary to dissemination of the previously detected foci of pulmonary aspergillosis.

The clinical features of renal involvement are nonspecific, usually consisting of fever and abdominal pain (1-4). Radiological imaging modalities have an important role in the diagnostic workup of these lesions. US and CT are typically first imaging tests to be performed. Unfortunately, both examinations have non-specific findings, showing a mass lesion with a heterogeneous internal structural pattern (1,2). CT usually delineates an expanded mass lesion with peripheral contrast uptake and a heterogeneous inner structure. There are hypodense regions consistent with abscess formation or necrosis within the lesion (1-4). Unfortunately, it is almost impossible to distinguish such a pattern from that of a malign tumor or a pyelonephritic abscess formation.

Magnetic resonance imaging is generally superior to CT for the characterization of renal mass lesions (2). Heussel et al. (2), for the first time, described the MRI findings of renal aspergillosis and initially considered renal cell carcinoma (RCC) in

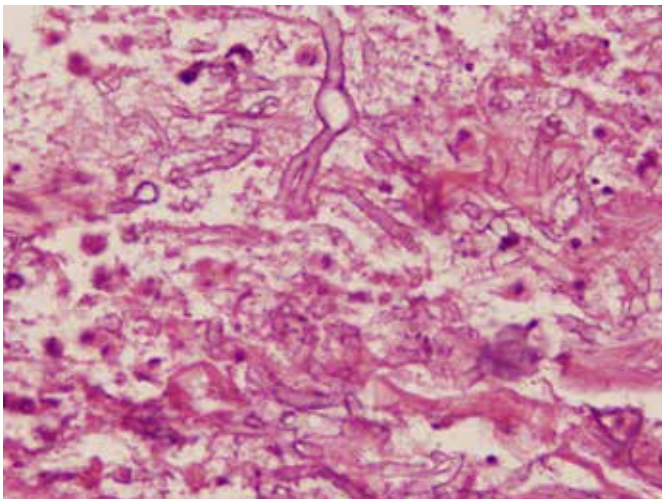

FIG. 4. Septate and branching Aspergillus hyphae (Periodic Acid Schiff)

the differential diagnosis. Renal involvement of aspergillosis is characterized by heterogeneous mass lesions with irregular hypointense walls containing central hyperintense regions in T2W images. In a case reported by Wetterauer et al. (5), T2W imaging characteristics were similar, while the aspergilloma had a smooth, hypointense wall. Furthermore, a pseudocapsule with irregular contrast uptake can also be distinguished in post-contrast series. Similar properties were also noted in T2W and post-contrast T1W images on MRI examination of our case. However, while the post-contrast MRI findings of the case reported by Meng et al. (6) overlapped with the findings of our case, hypointensity of the pseudocapsule was not as stressed in T2W images. Similarly, the signal intensification in the central part of the lesion was not prominent in T2W images, either. The authors explained this finding by a lesser extent of liquefaction of the necrotic tissues (6).

A review of renal aspergillosis cases reported so far indicates that the fungal abscess formation was the most notable finding in the cross-sectional imaging modalities (6). Recently, many reports have been published on the use of DWI for different organs and pathologies. A limitation of diffusion is a common finding for brain abscesses and indicates a high cellular content and hyperviscosity (7). Rathod et al. (8) stressed the role of DWI without contrast in the diagnosis of renal abscesses. The differential diagnosis of renal aspergilloma includes primary and secondary renal malignancies (particularly RCC), lymphoma, bacterial pyelonephritic abscess, renal tuberculosis, and infarction with central necrosis (6). In our case, renal lymphoma involvement due to a history of NHL and RCC was primarily considered in the differential diagnosis. On the other hand, a marked limitation of diffusion of the lesion in DWI images in addition to a history of pulmonary aspergillosis also made us consider the possibility of a fungal renal abscess. PET-CT showing only peripheral uptake also supported the diagnosis. For these reasons, a fine needle aspiration biopsy was first performed for a definitive diagnosis; the histopathological examination of the biopsy specimen revealed signs of renal aspergilloma.

In conclusion, renal aspergilloma should be remembered in the differential diagnosis of renal masses detected by radiological imaging modalities in patients with conditions predisposing them to aspergillosis. Although the findings of cross sectional imaging examinations are nonspecific, a multimodality approach is highly beneficial for narrowing the list of differential diagnoses. For a definitive diagnosis and treatment plan, however, we still recommend imaging-guided sampling from suitable lesions, followed by histopathological and/or microbiological examination.

Ethics Committee Approval: N/A.

Informed Consent: Written informed consent was obtained from patient who participated in this study.

Peer-review: Externally peer-reviewed.

Author contributions: Concept - M.B., M.G.K., I.K.; Design - M.B., I.K.; Supervision - M.B., M.G.K.; Resource - M.B., M.G.K., S.T.; Materials - M.B., E.Ç., I.K.; Data Collection and/or Processing - M.B., E.Ç., I.K.; Analysis and/or Interpretation - M.B., M.G.K.; Literature Search - M.B., S.T.; Writing - M.B., M.G.K., E.Ç., S.T., I.K.; Critical Reviews - M.B., M.G.K., E.Ç., S.T., I.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

1. Poll LW, Koch J, Medve M, May P, Sarbia M, Engelbrecht V, et al. CT appearance of a renal aspergilloma in a patient with the acquired immunodeficiency syndrome. *Urol Int* 1999;62:110-3. [CrossRef]
2. Heussel CP, Kauczor HU, Heussel G, Thelen M, Jahn B. Multiple renal aspergillus abscesses in an AIDS patient: contrast-enhanced helical CT and MRI findings. *Eur Radiol* 1999;9:616-9. [CrossRef]
3. Fiteni I, Crusells MJ, Cuesta J, Letona S. Renal invasive aspergilloma: unusual infection in AIDS. *J Infect* 1996;33:61-3. [CrossRef]
4. Halpern M, Szabo S, Hochberg E, Hammer GS, Lin J, Gurtman AC, et al. Renal aspergilloma: an unusual cause of infection in a patient with the acquired immunodeficiency syndrome. *Am J Med* 1992;92:437-40. [CrossRef]

5. Wetterauer C, Rieken M, Müller G, Bachmann A, Bonkat G. Renal aspergilloma: retroperitoneoscopic resection as a minimally invasive organ preservation treatment option. *Urologe A* 2014;53:545-7. [CrossRef]
6. Meng XC, Jiang T, Yi SH, Xie PY, Guo YF, Quan L, et al. Renal aspergillosis after liver transplantation: clinical and imaging manifestations in two cases. *World J Gastroenterol* 2014;20:18495-502. [CrossRef]
7. Xu XX, Li B, Yang HF, Du Y, Li Y, Wang WX, et al. Can diffusion-weighted imaging be used to differentiate brain abscess from other ring-enhancing brain lesions? A meta-analysis. *Clin Radiol* 2014;69:909-15. [CrossRef]
8. Rathod SB, Kumbhar SS, Nanivadekar A, Aman K. Role of diffusion-weighted MRI in acute pyelonephritis: a prospective study. *Acta Radiol* 2015;56:244-9. [CrossRef]