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A Renal Cyst Invaded by Infiltrating Renal Cell Carcinoma With Multiple Hypermetabolic Bone Metastases as the Initial Presentation

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Abstract: Cystic renal cell carcinoma (RCC) refers to an indolent version of RCC composed predominantly of cysts, and it is associated with good prognosis. We showed the FDG PET/CT findings in a patient with multiple hypermetabolic bone metastases presenting with pain in the left shoulder and upper abdomen, who was later found to have cystic RCC. FDG PET/CT demonstrated hypermetabolic bone lesions and slight thickening of the renal cyst wall with light metabolism. This report indicates the risk of misdiagnosing cystic RCC as a renal cyst.

Key Words: FDG PET/CT, SUV_{max}, cystic renal cell carcinoma, renal cyst, bone metastases

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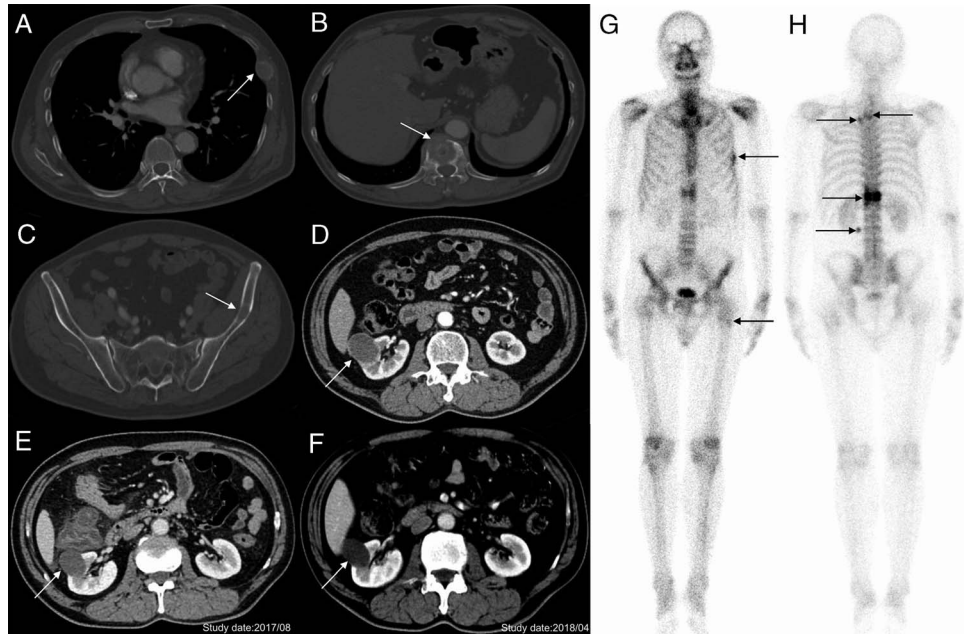

FIGURE 1. A 63-year-old man presented with a 3-month history of pain from the left shoulder and upper abdomen was admitted to our hospital. The CT image of the left sixth rib (**A**), thoracic vertebrae (**B**), and left iliac (**C**) showed bone destruction (arrows in **A**–**C**). The CT image (**D**) showed a Bosniak class IV right renal cyst (arrow). Previous images in 2017 (**E**) and 2018 (**F**) were reviewed, and CT revealed that the renal cyst was slowly enlarging from 34 mm (arrow) to 37 mm (arrow) at its greatest diameter. Because of diagnosis of bone destruction revealed by CT, ^{99m}Tc-MDP bone scan was performed to check whole-body bone condition. Anterior view (**G**) showed increased activity of left sixth rib and left femur (arrows). Posterior view (**H**) showed increased activity of second thoracic vertebrae, left transverse process of the third thoracic vertebrae, the 12th thoracic vertebrae, and left transverse process of the third lumbar vertebrae (arrows). The diagnosis of bone scan was multiple bone metastases.

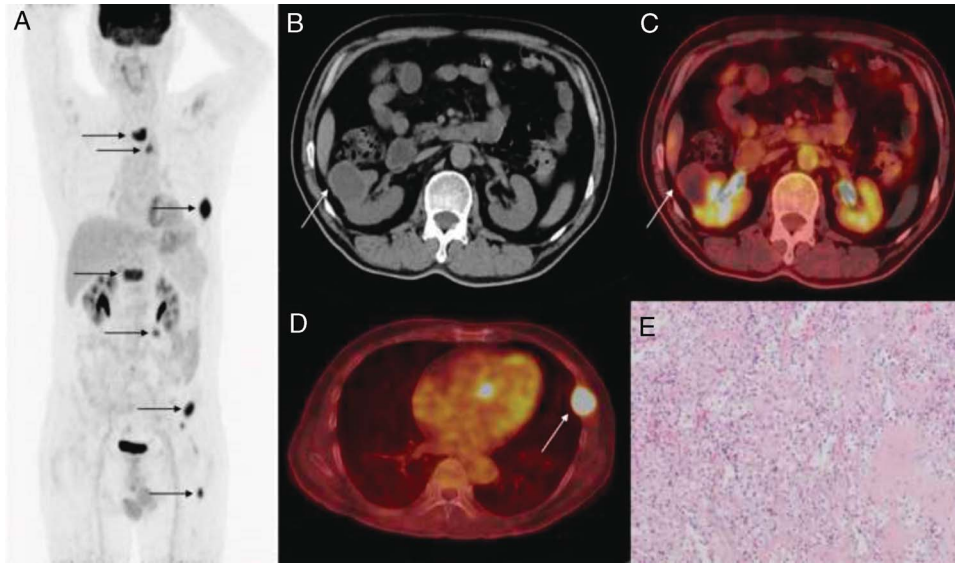

FIGURE 2. Because of multiple bone metastases, FDG PET/CT was performed to check for the presence of a primary lesion. FDG MIP (**A**) demonstrated multiple hypermetabolic osteolytic metastases (arrows, the second thoracic vertebrae, left transverse process of the third thoracic vertebrae, left sixth rib, the 12th thoracic vertebrae, left transverse process of the third lumbar vertebrae, left iliac bone, and left femur). Transverse CT (**B**) showed a right renal cyst with slightly thickened cyst wall (arrow), and fusion image (**C**) showed light metabolism (arrow). The SUV_{max} of the osteolytic lesions was 16.6, whereas that of the thickened cyst wall was 1.3. Despite the metabolic mismatch, we suspected that the bone metastases were related to the kidney lesion, which may be renal cell carcinoma (RCC)–infiltrating cyst wall. The patient underwent a puncture biopsy of the left sixth rib and the surrounding soft tissue mass (**D**), which has the highest uptake of osteolytic lesions (arrow). The diagnosis of cystic RCC, stage T1aNxM1 was confirmed. Histopathologic examination (**E**) showed cells with copious clear cytoplasm and nuclei with prominent, eosinophilic nucleoli (hematoxylin-eosin stain, original magnification, ×100). Cystic RCC refers to an indolent version of RCC. The cystic appearance of RCC may be due to intrinsic unilocular or multilocular cystic growth, cystic necrosis, or origin from the epithelial lining of a preexisting simple cyst.[1] Most cystic RCCs show slowly enlargement in size, and none showed postsurgical recurrence or metastasis.[2–4] Metastases to the bones are frequent and occur in 35% to 40% of cases of advanced RCCs. Usually, these metastases are highly destructive and osteolytic.[5] However, in our case, cystic RCC led to bone metastases. The uptake of bone metastasis was relatively high for RCC metastasis. The uptake of RCC was relatively low because of lower glucose metabolism.[6] Metastatic RCC is refractory to chemotherapy.[7] Sorafenib is a small-molecule inhibitor of multiple protein kinases, which has been established as first-line systemic therapy for patients with advanced RCC.[8] Herein, the patient finally chose targeted therapy with sorafenib. This case highlights the risk of misdiagnosing cystic RCC as a renal cyst and cystic RCC caused hypermetabolic bone metastasis, which should be handled carefully.