Incidental Detection of Peri-Renal Hemorrhage on F-18 FDG PET/CT Imaging in a Patient with Polycystic Kidney Disease

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Abstract

A 72-year-old male patient with a history of polycystic kidney disease and lung malignancy underwent F-18 fluorodeoxyglucose positron emission tomography/computed tomography (FDG PET/CT) for the evaluation of tumor recurrence. The FDG PET/CT and subsequent non-enhanced CT scans revealed a hemorrhage in the peri-renal space of the left original kidney. Interesting in this case was the incidental detection of unexpected peri-renal hemorrhage during an oncologic assessment with FDG PET/CT.

Keywords FDG PET/CT · Peri-renal hemorrhage · Hematoma · Polycystic kidney disease

Hemorrhagic renal cysts are the most frequent complication of patients with PKD [1]. The cause of cyst rupture with hemorrhage is unclear, as it is not known whether expansion with increased intracystic pressure occurs, with the subsequent tearing of blood vessels, or whether hemorrhage into the cyst is the first event, with subsequent rupture from cyst expansion [2]. Bleeding is usually confined within the cyst but occasionally extends into the renal collecting system leading to hematuria or into the perinephric space leading to peri-renal hematoma, or retroperitoneal hemorrhage. Perinephric hematomas have been reported in up to 13% of patients with PKD [3].

Belville suggested that CT scanning is the most valuable examination for patients with spontaneous renal hemorrhage [5]. However, increased FDG uptake in response to hemorrhage has been reported in other soft tissues, including aortic wall hematoma, pelvic hematoma, subarachnoid hemorrhage and adrenal hemorrhage [5, 6]. Although pathophysiology of FDG uptake in hemorrhage remains to be defined, the FDG uptake in hematoma is due to the extravasation of activated macrophages [7]. In the present case, the FDG-PET/CT scan was useful to diagnose an unexpected renal hemorrhage in a patient with PKD.

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Fig. 1 A 72-year-old male received a kidney transplant 8 years ago because of polycystic kidney disease (PKD) and a left lower lobectomy 3 years ago for lung adenocarcinoma. The patient had undergone F-18 fluorodeoxyglucose (FDG) positron emission tomography/computed tomography (PET/CT) regularly for the evaluation of tumor recurrence. There was no evidence of tumor recurrence, and the original polycystic kidney was FDG non-avid

Fig. 2 During the FDG PET/CT follow-up, a PET/CT scan revealed a heterogeneous hypermetabolic lesion (arrow, SUVmax = 9.9) in the anteromedial aspect of the renal hilum and peri-renal space of the left original kidney. Non-enhanced CT images of FDG PET/CT showed multiple cysts with different radiologic features such as high density or wall calcification in the left original kidney. The pulse was 90/min; blood

pressure was 110/60 mmHg. Hemoglobin was 12.2 g/dl (normal range, 13.5–17.5 g/dl for males), hematocrit was 34.8% (normal range, 39–51% for males), and WBC count was $9.9 \times 10^3/\mu\text{l}$ (normal range, $4\text{--}10 \times 10^3/\mu\text{l}$). Peri-renal hemorrhage was suspected, and the patient was put on absolute bed rest and discontinuation of the anticoagulation drug (low-dose aspirin)

Fig. 3 At 5 days after the FDG PET/CT scan, the patient had an acute onset of left flank pain and nausea. Pulse was 110/min; blood pressure was 100/40 mmHg. Hemoglobin was 9.7 g/dl, hematocrit was 28.8%, and WBC count was $10.6 \times 10^3/\mu\text{l}$. A subsequent non-enhanced CT scan of the abdomen and pelvis showed massive hematoma lesions (arrows) in the inferior and posterior aspects of the left original kidney. The retroperitoneal hematoma extended caudally to the left lower pelvis along the anterior aspect of the left psoas muscle

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Compliance with Ethical Standards

Conflict of Interest Dae-Weung Kim declares that this work was supported by Wonkwang University in 2017. Myoung Hyoun Kim declares that he has no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent The institutional review board of our institute approved this retrospective study, and the requirement to obtain informed consent was waived.

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