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【 CASE REPORT 】

Renal Mucinous Tubular and Spindle Cell Carcinoma Shows a High Uptake on ^{18}F-FDG PET/CT

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Abstract:
We herein report a rare case of mucinous tubular and spindle cell carcinoma (MTSCC) in an 80-year-old woman. A well circumscribed tumor located on the right kidney was discovered incidentally as a result of screening non-contrast CT. Fluorodeoxyglucose positron emission tomography (FDG PET)/CT showed the increased tracer accumulation in the tumor. The histological diagnosis was MTSCC, which is a rare and only recently established subtype of the malignant renal cell carcinoma (RCC). The present case suggests the clinical benefit of a high uptake of FDG combined with enhanced contrast CT in the differentiation of MTSCCs and other RCCs.

Key words: mucinous tubular and spindle cell carcinoma, renal cell carcinoma, FDG PET/CT

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Introduction

^{18}F-fluorodeoxyglucose positron emisshion tomography (FDG PET)/CT is used to assess the malignant tumors, however only slight uptake is shown in the common type of renal cell carcinoma (RCC). Mucinous tubular and spindle cell carcinoma (MTSCC) is a rare, recently described variant of renal cell carcinoma (RCC). There has been few reports to evaluate the MTSCC using FDG PET/CT.

Case Report

We herein report a rare case of MTSCC in an 80-year-old woman. The patient, who was a nonsmoker had a medical history of hypertension and was using antihypertensive drugs. A well circumscribed tumor located on the right kidney was discovered incidentally as a result of a non-contrast screening CT (Fig. 1A). Contrast-enhanced CT revealed a spherical mass with an inhomogeneous and comparatively slow wash-in contrast enhancement pattern (Fig. 1D and E). ^{18}F-FDG PET/CT showed the increased accumulation of tracer in the tumor, with an SUVmax of 28.6 (Fig. 1B and C). The results of biochemical analyses were as follows: fasting glucose, 104 mg/dL; creatinine, 0.71 mg/dL; urea, 12 mg/dL (the aspartate aminotransferase, alkaline phosphatase, and gamma glutamyl transferase levels were within normal ranges); white blood cells (WBCs) count, 7.4 10^3/μL; hemoglobin, 12.4 g/dL; sodium, 139 mmol/L; potassium, 4.5 mmol/L; chlor, 108 mEq/L; and calcium, 9.4 mg/dL. Results of a routine urinalysis were as follows: color, clear yellow; clear ketones, negative; blood, negative; specific gravity, 1.007; bilirubin, negative; nitrites, negative; pH, 5.5; urobilirubin, 0.1 mg/dL; red blood cells, <1 /hpf; WBCs, 1-4 /hpf; epithelial cells, 1-4 /hpf; crystals, negative; bacteria, negative; and yeast, negative.

The histological diagnosis was MTSCC which is a rare and only recently established subtype of the malignant RCC subtype (Fig. 2).

Discussion

MTSCC is a malignant RCC subtype that has been classified as a distinct entity in the World Health Organization

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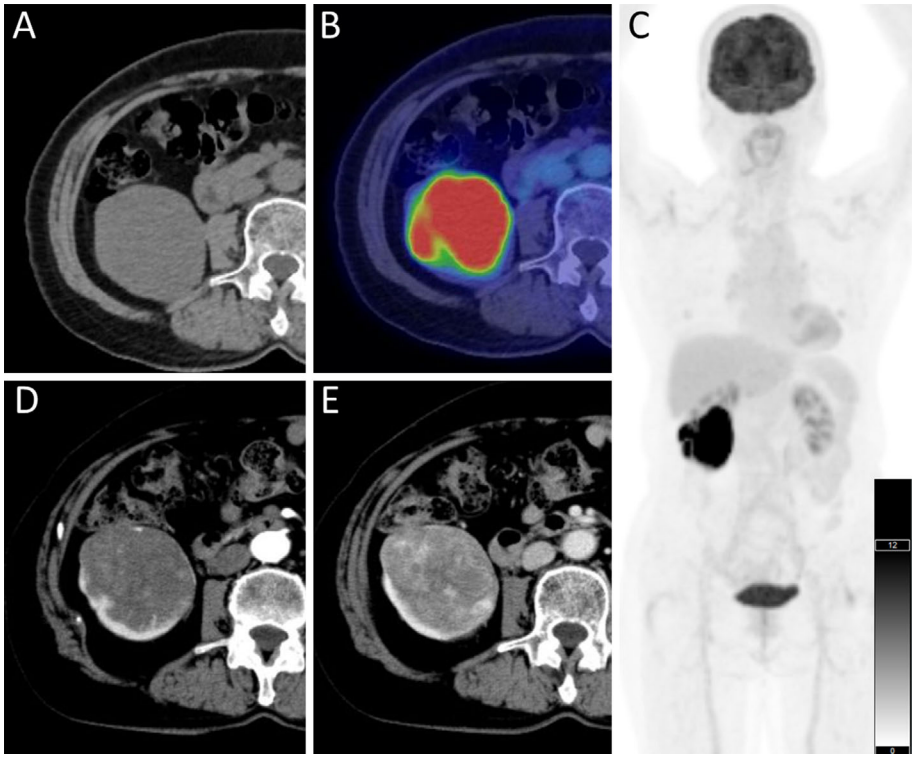

Figure 1. **The ^{18}F-FDG PET/CT findings. A well circumscribed tumor of the right kidney was discovered incidentally as a result of a non-contrast screening CT (A). Contrast-enhanced CT revealed a 7.5×6.9 cm spherical mass with an inhomogeneous and comparatively slow wash-in contrast enhancement pattern (D, E). On ^{18}F-FDG PET/CT, the showed the increased accumulation of tracer with an SUVmax value of 28.6 (B, C).**

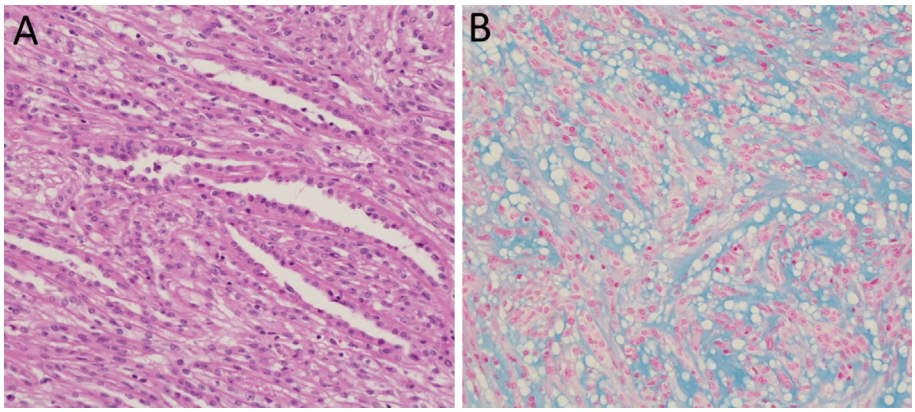

Figure 2. **The pathological findings. Laparoscopic unilateral nephrectomy was performed and the histological diagnosis was a mucinous tubular and spindle cell carcinoma (MTSCC) based on identification of cuboidal cells arranged in tubules (A), abrupt transitions to spindle cell morphology and alcian blue staining, which revealed mucin (B).**

(WHO) classification of adult renal epithelial neoplasms since 2004. MTSCC accounts for <1% of all renal neoplasms and shows a female predominance (1). It is characterized by low-grade cuboidal cells arranged in tubules, a variable amount of bland spindle cells, and it is set within a myxoid matrix of extracellular mucin (2). Our case is highly consistent with these typical pathological findings. MTSCCs usually grow silently, are discovered incidentally, and have a favorable prognosis. Thus, MTSCCs must be differentiated from other RCCs that have a much poorer prognosis (3). Some of the CT features of MTSCCs and papillary RCCs overlap, and differentiation between the two entities is often difficult (2). Common types of RCC (*i.e,* clear cell and papillary RCCs) often show only a slightly increased uptake of ^{18}F-FDG (4). ^{18}F-FDG is a glucose analog that enters cells through the membrane glucose transporter (GLUT) that is commonly overexpressed in malignant tumor cells. In RCC, the decreased activity of glucose-6 phosphatase (glucose-6-

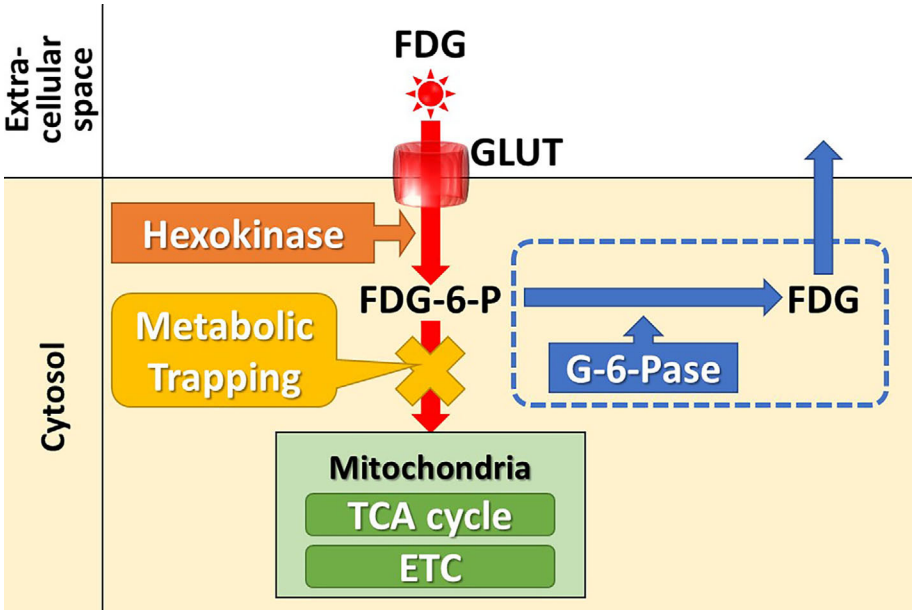

Figure 3. **The mechanisms of a low uptake of ^{18}F-FDG in renal cell carcinoma. ^{18}F-FDG is actively transported into the cell and converted to ^{18}F-FDG-6-phosphate (^{18}F-FDG-6-P) by a hexokinase. ^{18}F-FDG-6-P cannot be further metabolized as it lacks the 2-hydroxyl group (exchange with fluor). Thus, it is trapped in the cell and accumulates in a manner that corresponds to the glucose metabolic activity (metabolic trapping). In renal cell carcinoma, glucose-6-Pase restores ^{18}F-FDG-6-P to ^{18}F-FDG, which can pour out of the cell.**

Pase) may be related to the accumulation of ^{18}F-FDG, which is considered negligible in most tumors with the exception of hepatocellular carcinoma (Fig. 3). Thus, the uptake of ^{18}F-FDG in RCC is limited and difficult to assess in addition to the normal renal visualization from the physiological excretion of ^{18}F-FDG. Reports on the utility of ^{18}F-FDG PET/CT in the diagnosis of MTSCC are limited. Ozturk reported a case of MTSCC that was diagnosed with the help of magnetic resonance imaging (MRI) and the ^{18}F-FDG PET findings (5). In this report, the obvious uptake of ^{18}F-FDG was seen in the entire mass of MTSCC. The mechanism of ^{18}F-FDG accumulation in MTSCC remains unknown, the glucose metabolism pathway, including components such as GLUT and hexokinase, might be different from RCC.

Malignant lymphoma (ML) and genitourinary system tumors can be considered as differential diagnoses with a high uptake of ^{18}F-FDG (4-6). The enhancement pattern of the mass can help to differentiate ML from most tumors. Homogenous enhancement without vascular invasion is typical for ML, which is not seen in other renal tumors (7-9). Genitourinary system tumors, such as advanced upper tract urothelial carcinoma (UTUC) extend and infiltrate into the renal parenchyma and a sessile filling defect is generally visible (10, 11). UTUC usually shows early enhancement and de-enhancement after the administration of the contrast agent. Additionally, hydronephrosis and a thickened ureteric wall with enhancement are characteristic findings that allows for differentiation from MTSCC (10, 11).

The present case suggests the clinical benefit of a high uptake of ^{18}F-FDG combined with enhanced contrast CT in the differentiation of MTSCCs and other RCCs.

The authors state that they have no Conflict of Interest (COI).

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