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A case of renal pelvic tumor visualized by ^{18}F-FDG-PET imaging

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^{18}F fluorodeoxyglucose positron emission tomography (^{18}F-FDG PET) imaging is a useful modality in detecting various tumors, including renal cell carcinoma. We evaluated a patient with renal pelvic tumor (transitional cell carcinoma) with multiple metastases using ^{18}F-FDG PET imaging and detected abnormal increased uptake of a right renal pelvic tumor extending to the renal cortex with liver metastasis and paraaortic lymph node metastases. These results suggest that ^{18}F-FDG PET imaging may be useful in detecting primary and metastatic lesions of renal pelvic tumor (transitional cell carcinoma).

Key words: ^{18}F-FDG PET, renal pelvic tumor, transitional cell carcinoma, tumor imaging

INTRODUCTION

TRANSITIONAL CELL CARCINOMA of the upper urinary tract is an uncommon disease. It is estimated that renal pelvis tumors constitute less than 1% of all urinary tract tumors.[1] Radiological imaging plays a critical role in detection, evaluation, and disease monitoring.[2]

^{18}F fluorodeoxyglucose (^{18}F-FDG) has been demonstrated to have affinity for a variety of malignant tumors.[3] Tumor uptake of ^{18}F-FDG in renal cell carcinoma[4] and bladder cancer[5] was reported. ^{18}F-FDG may accumulate in renal pelvic tumor. However, to our knowledge, tumor uptake of ^{18}F-FDG in renal pelvic tumor (transitional cell carcinoma) has not been described in detail.

In this paper we describe our attempt to detect primary and metastatic lesions in a patient with renal pelvic tumor (transitional cell carcinoma) using ^{18}F-FDG PET.

CASE REPORT

A 77-year-old man was admitted with low abdominal pain. Physical examination showed a hard mass in the right abdomen. Urinary examination revealed macroscopic hematuria. CT was performed to evaluate the palpable mass in the right abdomen. Enhanced CT revealed a hypo-enhanced pelvic tumor extending to the renal cortex with multiple enlarged lymph nodes in the bilateral paraaortic areas and a small nodule in the liver (Fig. 1). Transitional cell carcinoma was proven by biopsy from the renal pelvic tumor, which was noted on enhanced CT.

^{18}F-FDG PET imaging was also performed. We obtained PET scans with a Siemens EXACT HR$^+$ scanner (Siemens/CTI, Knoxville, TN, USA). We asked a patient to fast for 6 h beforehand. A whole-body acquisition started 60 min after injection of 185 MBq ^{18}F-FDG. Emission data were collected at 5 min per bed position for 45 min with no attenuation collection. ^{18}F-FDG PET findings were visually correlated with those of subsequent CT. ^{18}F-FDG PET imaging revealed abnormal increased uptake of the right renal pelvic tumor extending to the renal cortex with liver metastasis and paraaortic lymph node metastases (Fig. 2).

DISCUSSION

Primary tumors of the renal pelvis are uncommon. Transitional cell carcinoma accounts for approximately 90% of all cancers of the renal pelvis. Eighty-five to 95% of

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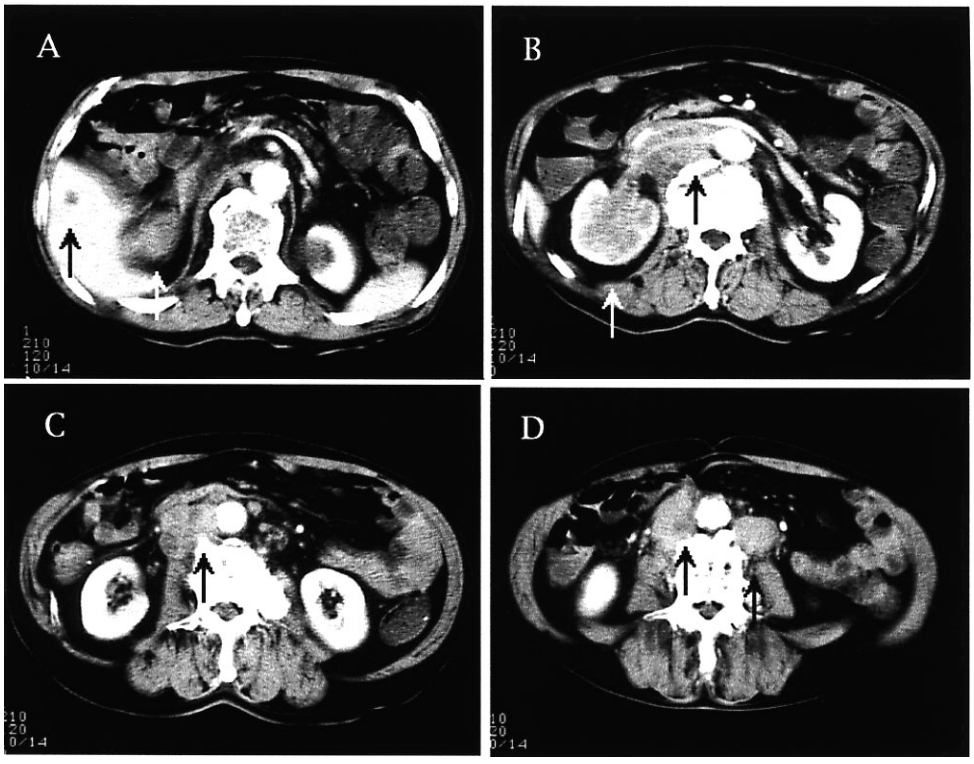

Fig. 1 Enhanced CT revealed a hypo-enhanced right pelvic tumor extending to the renal cortex (*white arrows* in A and B) with liver metastasis (*black arrow* in A) and paraaortic lymph node metastases (*black arrows* in B, C, and D).

uroepithelial carcinomas are transitional cell tumors, approximately 10% are squamous cell carcinomas, and less than 1% are adenocarcinomas. The clinical presentation of transitional cell carcinoma of the renal pelvis is nonspecific making the radiologic evaluation critical for both initial detection and subsequent evaluation and disease monitoring.[2] CT provides excellent detail of the kidney and urinary tract. CT is also useful in determining the site of origin of a lesion. Differentiation of transitional cell carcinoma from renal cell carcinoma is aided by the less marked enhancement of a transitional cell tumor as opposed to hypervascular renal tumors.[2] In our case, a renal pelvic tumor with multiple metastases was noted on enhanced CT.

^{18}F-FDG has been demonstrated to have affinity for a variety of malignant tumors.[3] Recently Ramdave et al. reported that ^{18}F-FDG PET accurately detected local disease spread and metastatic disease in patients with renal cell carcinoma. They suggested that ^{18}F-FDG PET may have a role in the diagnostic evaluation of patients with renal cell carcinoma preoperatively and staging of metastatic disease.[4] Kosuda et al. showed the feasibility of ^{18}F-FDG PET for transitional cell carcinoma of the bladder.[5] These results suggested that ^{18}F-FDG may accumulate in transitional cell carcinoma of the renal pelvis. To our knowledge, only one case of ^{18}F-FDG tumor uptake in renal pelvic tumor has been described in pilot human studies.[6]

^{18}F-FDG PET imaging was performed in a patient with renal pelvic tumor with liver metastasis and paraaortic lymph node metastases detected on CT. The excretory route of ^{18}F-FDG in the urine results in physiological distribution of ^{18}F-FDG in the kidney and collecting system, making the detection of renal tumors more challenging than that of tumors located elsewhere.[7] It has been shown that the visual correlation of PET with CT can improve the accuracy of PET alone.[8] In our case, abnormal increased uptake of ^{18}F-FDG in renal pelvic tumor, liver metastasis and paraaortic lymph node metastases was demonstrated clearly with visual correlation of PET with CT. Moreover, Ma et al. reported that an additional 3 hour scan is helpful for the detection of paraaortic lymph node metastases.[9] However, in our case delayed scan was not performed.

CONCLUSION

We succeeded in demonstrating uptake by a renal pelvic tumor (transitional cell carcinoma) with liver metastasis and paraaortic lymph node metastases using ^{18}F-FDG PET imaging. These results suggested that ^{18}F-FDG PET imaging may be a useful modality to detect primary and metastatic lesions of renal pelvic tumors (transitional cell carcinoma).

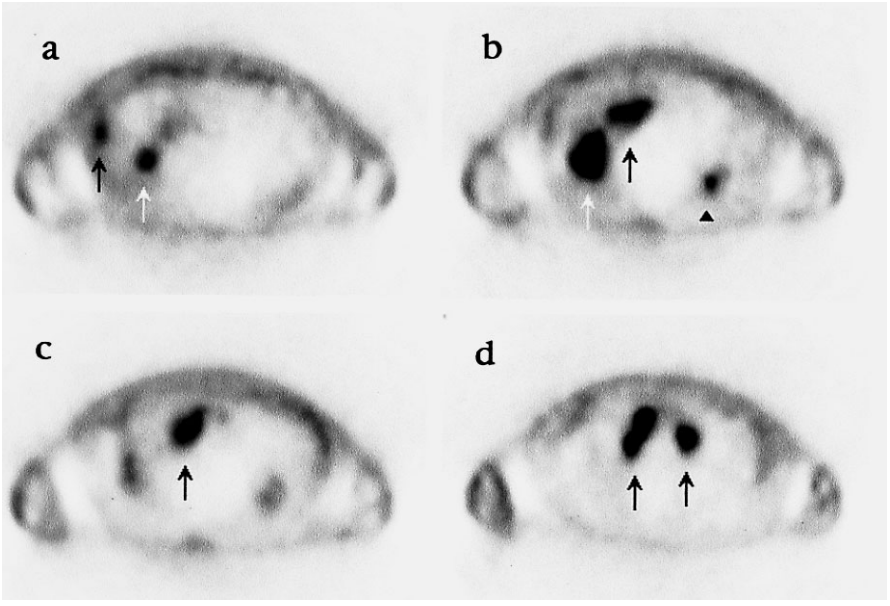

Fig. 2 Axial images of ^{18}F-FDG PET obtained at same levels as A, B, C, and D respectively, revealed abnormal increased uptake of the right renal pelvic tumor extending to the renal cortex (*white arrows* in a and b) with liver metastasis (*black arrow* in a) and paraaortic lymph node metastases (*black arrows* in b, c and d). Physiological uptake of the left renal pelvis was shown (*arrowhead* in b).

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