Case Report

Subcutaneous fatty tissue metastasis from renal cell carcinoma detected with fluorine-18 fluorodeoxyglucose positron emission tomography/computed tomography and magnetic resonance imaging

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ABSTRACT

A patient who had undergone left radical nephrectomy 11 years ago for renal cell carcinoma (RCC) was referred to our clinic for restaging. Fluorine-18 fluorodeoxyglucose (F18-FDG) positron emission tomography/computed tomography (F18-FDG PET/CT) showed hypometabolic area in left frontal region of the brain and increased FDG uptake in the subcutaneous fatty tissues of the right thigh. Histopathological examination of the biopsy material from the left frontal region and right gluteal region revealed metastasis of clear cell type RCC. Seven months later, a magnetic resonance ımaging (MRI) of right cruris showed a contrast-enhancing lesion with a diameter of 3.5 cm, located at the subcutaneous area of posterior part of right cruris. A concomitant F18-FDG PET/CT detected an increased FDG uptake focus in the proximal third of right cruris adjacent to the muscle planes and this finding was consistent with metastasis of RCC.

Keywords: Metastasis, positron emission tomography, renal cell carcinoma, soft tissue neoplasm

INTRODUCTION

Renal cell carcinoma (RCC) accounts for 3% of all adult malignancies.[1-2] RCC has an unpredictable metastasis potential with a tendency to show late recurrence and metastasizes to nearly all systems of the body.[3-4] RCC metastasizes most commonly to lungs, lymph nodes, bones, liver and brain.[4] In autopsy series, skeletal muscle metastases have been detected in about 0.4% of patients with RCC.[4] Subcutaneous fatty tissue metastases are extremely unusual findings for RCC. We report a patient who presented with soft tissue metastases of RCC detected with fluorine-18 fluorodeoxyglucose (F18-FDG) positron emission tomography/computed tomography (F18-FDG PET/CT) and magnetic resonance imaging (MRI).

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CASE REPORT

We present a 46-year-old male patient who had undergone left radical nephrectomy for RCC 11 years ago and did not show any metastases during the follow-up period. He was admitted to our hospital for investigation of headache and he underwent F18-FDG PET/CT for restaging purpose. After 6 hours of fasting and at a serum glucose of 95 mg/dl, the patient was intravenously injected with 481 MBq (13 mCi) of F18-FDG. After 60 mins of waiting in a semireclined relaxed chair, the patient was imaged using an integrated PET/CT scanner, which consisted of a full-ring HI-REZ LSO PET and a 6-slice CT (Siemens Biograph 6, Chicago, IL, USA). The CT portion of the study was done without an i.v. contrast medium, just for defining anatomical landmarks and making attenuation correction on PET images. F18-FDG PET/CT showed hypometabolic area in left frontal region of the brain and increased FDG uptake in the subcutaneous fatty tissues of the right thigh posterior to the gluteal muscle plans [Figure 1]. Histopathological examination of the biopsy material from the left frontal region and right gluteal region revealed metastasis of clear cell type RCC [Figures 2 and 3]. Seven months later, an MR of right cruris

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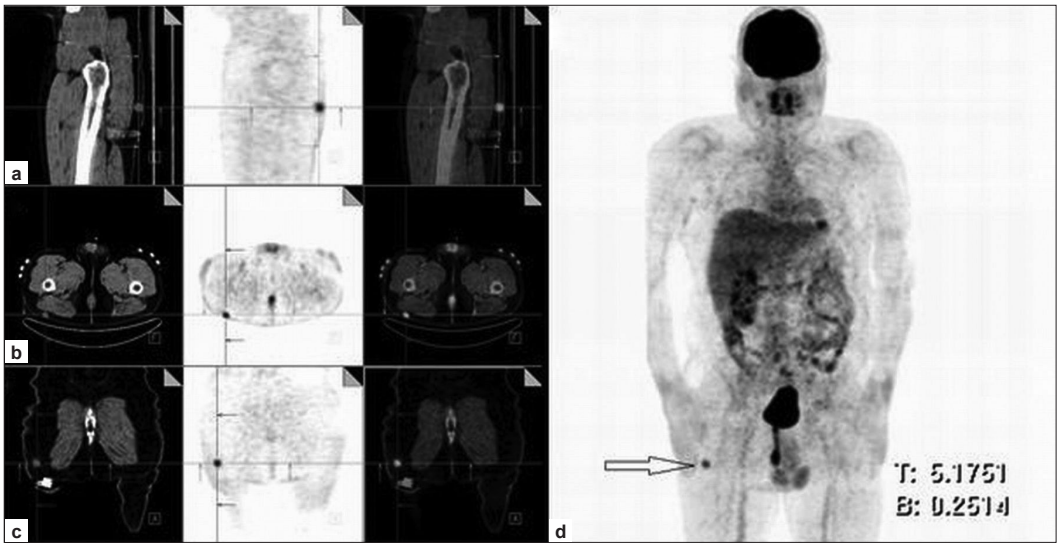

Figure 1: Selected sagittal (a), axial (b) and coronal (c) slices of CT, PET and fusion images and MIP image (d) of PET-CT showing increased focal FDG uptake in the subcutaneous fatty tissue posterior to the proximal gluteal muscle planes at right thigh

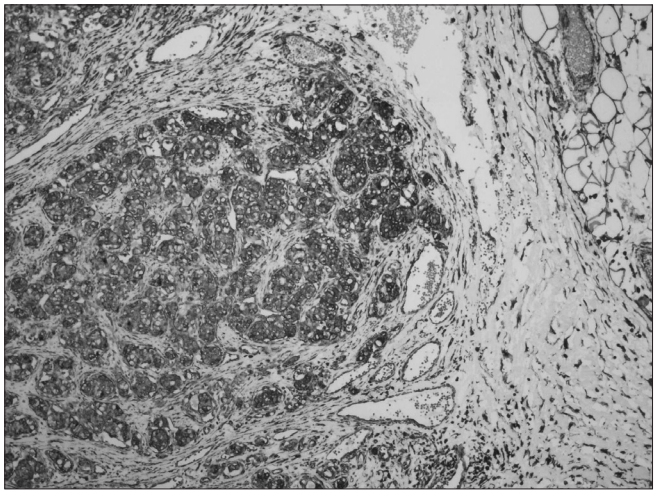

Figure 2: Typical vimentin positivity in the renal cell carcinoma cells (Vimentin Antibody, ×100)

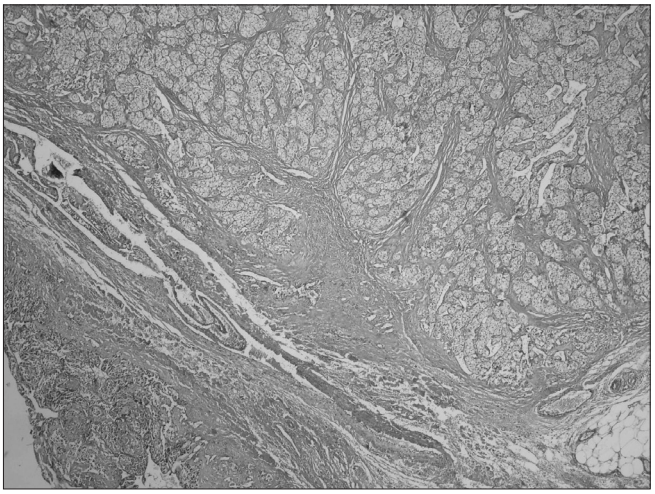

Figure 3: Malignant clear cell infiltration in the fibroadipose tissues, with vascular tumor embolus adjacent to the tumor (Hematoxylen and eosin, ×40)

which was done for the investigation of right leg pain showed a contrast-enhancing lesion with a diameter of 3.5 cm located at the subcutaneous area of posterior part of right cruris [Figure 4]. F18-FDG PET/CT detected an increased FDG uptake focus in the proximal third of right cruris adjacent to the muscle planes [Figure 5]. This finding was suspicious for metastasis of RCC.

Pathology

The gross specimen consisted of fatty and hemorrhagic tissue fragments which measured 2.5 × 1.5 × 1 cm totally. The microscopic examination revealed a clear cell proliferation arranged in nests and acinar structures in a delicate vascular fibrous stroma. The clear cells displayed Fuhrman Grade II–III nuclei.

The majority of the tumoral border was infiltrating in the adjacent adipose tissue, whereas it was expansile in character at some places. Tumor emboli were observed in the neighboring venous structure. Immunohistochemically, the tumor cells were positive with vimentin, pancytokeratin, EMA, CD10. Tumor cells did not stain with CK-7, S-100, HMB-45, synaptophysin, actin, desmin, and chromogranin. The immunohistochemical and morphologic features were consistent with RCC metastasis.

DISCUSSION

Muscle and soft tissue metastases of RCC are extremely rare.[3-6] Sakamoto *et al.* reported a patient who presented with metastasis to gluteus maximus muscle 6 years after he had undergone nephrectomy for RCC.[3] Nabeyama *et al.* reported a case presenting with metastases to brachioradial and triceps muscle 15 years after he had undergone radical nephrectomy for RCC.[4] Kang *et al.* have reported cases of facial muscle metastases of RCC.[7] Hur *et al.* reported a case presenting with psoas muscle and the erector spina muscle metastases of RCC, 19 years after radical nephrectomy.[5] Gozen *et al.* presented a patient with

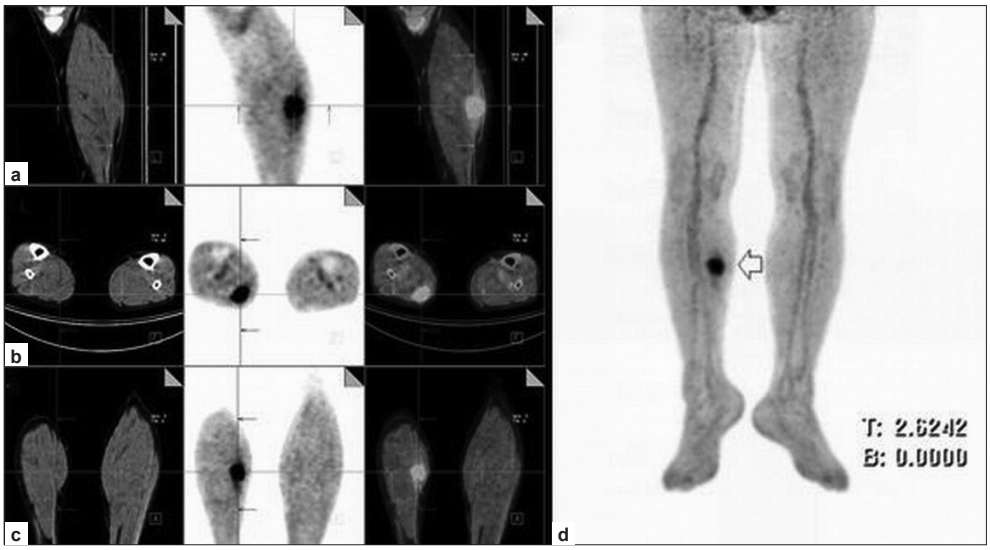

Figure 4: Selected sagittal (a), axial (b) and coronal (c) slices of CT, PET and fusion images and MIP image (d) of PET-CT showing increased focal FDG uptake at the posteromedial part of proximal third of right cruris

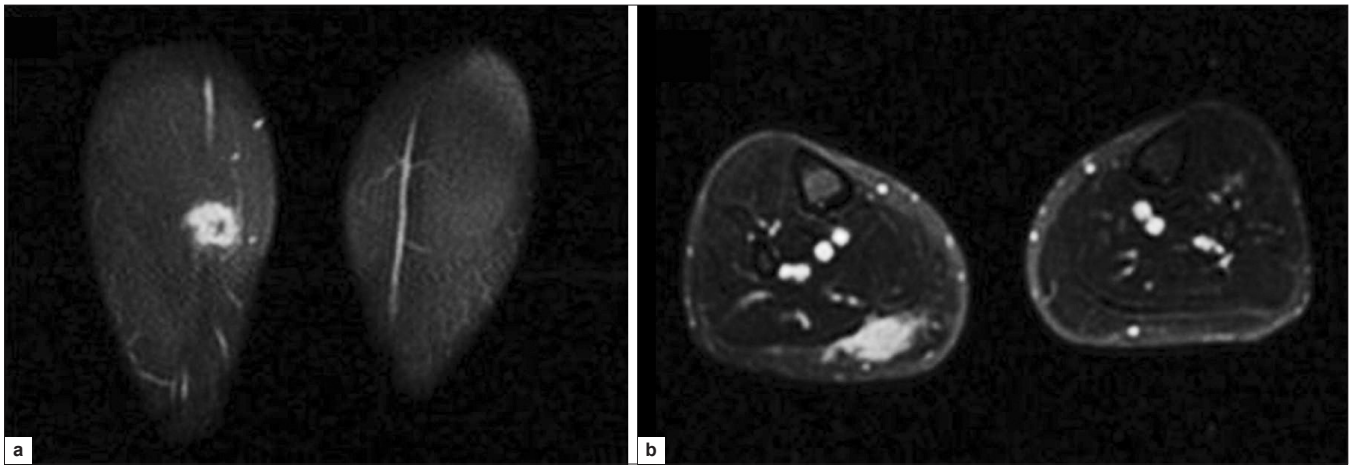

Figure 5: MRI shows a soft tissue lesion in the intermuscular area, with a diameter of 2.5 cm, which is hypointense on T1-weighted images (a) and hyperintense on T2-weighted images (b) and showing intense contrast enhancement

gastrocinemius muscle metastasis of RCC.[6] Beylergil *et al.*[8] reported a patient with RCC in whom metastases at infraspinatus, rectus abdominis, piriformis, and vastus medialis muscles were detected with PET/CT. In the present case, metastases were detected at frontal lobe of the brain and subcutaneous fat tissue of the right thigh proximal to the gluteal muscle planes, 10 years after radical nephrectomy, and at the proximal third of right cruris, posteromedial to the muscle planes.

In patients with RCC, secondary malignancies should be considered when pathologically increased FDG uptake is detected in soft tissues or muscles. Physiologically increased FDG uptake in muscles, especially in young patients, may be at times misleading. Inquiry for any history of trauma, exercise and repeating action in the anamnesis of the patient will be helpful in the interpretation of these views.

Aide *et al.* showed in their study that FDG PET did not appear to be an efficient tool for the detection and characterization of renal masses and FDG PET was more accurate than CT for detection of distant metastases, especially in delayed images.[9] Martínez de Llano *et al.* reported in their meta-analysis that FDG PET was less accurate than other imaging procedures in the diagnosis of the primary renal tumor and a negative study would not rule out the existence of disease while its positivity would support the suspicion of local recurrence or metastasis.[10]

Park *et al.* found that FDG PET/CT had 89.5% sensitivity, 83.3% specificity, 77.3% positive predictive value, 92.6% negative predictive value, and 85.7% accuracy in detecting recurrence or metastasis.[11]

Kumar *et al.* found that the overall sensitivity 85% for FDG PET in characterizing solid renal masses, detecting 23 of 27 malignant renal masses.[12]

Kılıç *et al.* reported a case with underwent surgery with diagnosis of RCC and developed contralateral adrenal metastasis 22 months after nephrectomy.[13]

Lordan *et al.* reported a case of a solitary liver metastasis found incidentally 20 years after radical nephrectomy for a RCC.[14]

During follow-up of patients with RCC, we must be cautious about the soft tissue lesions detected with FDG PET/CT, since they have the possibility of being metastatic lesions, although they are rarely seen.

REFERENCES

1. Jemal A, Siegel R, Ward E, Hao Y, Xu J, Thun MJ. Cancer statistics 2009. CA Cancer J Clin 2009;59:225-49.
2. Kirkali Z, Tuzel E, Mungan MU. Recent advances in kidney cancer and metastatic disease. BJU Int 2001;88:818-24.
3. Sakamoto A, Yoshida T, Matsuura S, Tanaka K, Matsuda S, Oda Y, *et al.* Metastasis to the gluteus maximus muscle from renal cell carcinoma with special emphasis on MRI features. World J Surg Oncol 2009;5:88.
4. Nabeyama R, Tanaka K, Matsuda S, Iwamoto Y. Multiple intramuscular metastases 15 years after radical nephrectomy in a patient with stage IV renal cell carcinoma. J Orthop Sci 2001;6:189-92.
5. Hur J, Yoon CS, Jung WH. Multiple skeletal muscle metastases from renal cell carcinoma 19 years after radical nephrectomy. Acta Radiol 2007;48:238-41.
6. Gözen AK, Canda AE, Naser M, Stock C, Rassweiler J, Teber D. Painful leg: A very unusual presentation of renal cell carcinoma. Urol Int 2009;82:472-6.
7. Kang S, Song B, Lee HJ, Jeong SY, Seo JH, Lee SW, *et al.* Isolated facial muscle metastasis from renal cell carcinoma on F-18 FDG PET/CT. Clin Nucl Med 2010;35:263-4.
8. Beylergil V, Er Ö, Çalıkuşu Z, Vardareli E. Renal hücreli tümör ile takip edilen olguda PET/BT ile tesbit edilen intramüsküler metastazlar. Acıbadem Üniversitesi Sağlık Bilimleri Dergisi 2010;1:1.
9. Aide N, Cappele O, Bottet P, Bensadoun H, Regeasse A, Comoz F, *et al.* Efficiency of F-18 FDG PET in characterising renal cancer and detecting distant metastases: A comparison with CT. Eur J Nucl Med Mol Imaging 2003;30:1236-45.
10. Martinez de Llano SR, Delgado-Bolton RC, Jiménez-Vicioso A, Pérez-Castejon MJ, Carreras Delgado JL, Ramos E, *et al.* Meta-analysis of the diagnostic performance of F-18 FDG PET in renal cell carcinoma. Rev Esp Med Nucl 2007;26:19-29.
11. Park JW, Jo MK, Lee HM. Significance of 18 F-fluorodeoxyglucose positron-emission tomography/computed tomography for the postoperative surveillance of advanced renal cell carcinoma. BJU Int 2010;103:615-9.
12. Kumar R, Chauhan A, Lakhani P, Xiu Y, Zhuang H, Alavi A. 2-Deoxy-2-[F-18]fluoro-D-glucose-positron emission tomography in characterization of solid renal masses. Mol Imaging Biol 2005;7:431-9.
13. Kılıç Ö, Göğüş Ç, Türkölmez K, Özden E, Özdiler E. Radikal nefrektomi sonrası soliter kontralateral adrenal metastazı gösteren renal hücreli kanser: Olgu Sunumu. Ankara Üniversitesi Tıp Fakültesi Mecmuası 2003;56:51-4.
14. Lordan JT, Fawcett WJ, Karanjia ND. Solitary liver metastasis of chromophobe renal cell carcinoma 20 years after nephrectomy treated by hepatic resection. Urology 2008;72:230.

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