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Case Report

Multiple Muscle Metastases of the Renal Cell Carcinoma After Radical Nephrectomy

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Skeletal muscle is a very rare location for the metastasis of renal cell carcinoma. We report a 48-year-old man with multiple metastases in skeletal muscles 4 years after right radical nephrectomy was carried out for grade III renal cell carcinoma. The tumors located in the right psoas, paravertebral, and gluteus medius muscles. We performed magnetic resonance imaging for detection metastatic lesions in our patient. In this case report, we discuss the characteristics of these metastatic lesions on magnetic resonance imaging.

Key words: Renal cell carcinoma – Multiple muscle metastases – MR imaging

Renal cell carcinoma (RCC) has widespread and unpredictable metastatic potential, even after curative nephrectomy is performed.[1–3] RCC is able to metastasize to virtually any site. The most common sites of metastatic RCC are the lungs, lymph nodes, bones, liver, adrenal glands, and brain.[1,4] In several autopsy series, about 0.4% of cases with RCC had skeletal muscle metastases.[2] Making a diagnosis of metastatic RCC to the skeletal muscle is challenging, because the site is unpredictable, in addition to it being rare, a recent review of the literature revealed some cases.[2–5]

In our study, we report a case of RCC with metastases to the right psoas, paravertebral, and gluteus medius muscles after 4 years right side radical nephrectomy. We wish to emphasize the magnetic resonance imaging (MRI) features of metastatic RCC to the skeletal muscles.

Case Report

A 48-year-old man was admitted to our department for periodic examination with a 6-month history of intermittent discomfort, lumbar pain and limping without preceding trauma. Four years earlier, he had had a right radical nephrectomy for RCC of the papillary-cell type (Fhurmann grade III; stage, pT2, pN0, pM0). On clinical examination, partially

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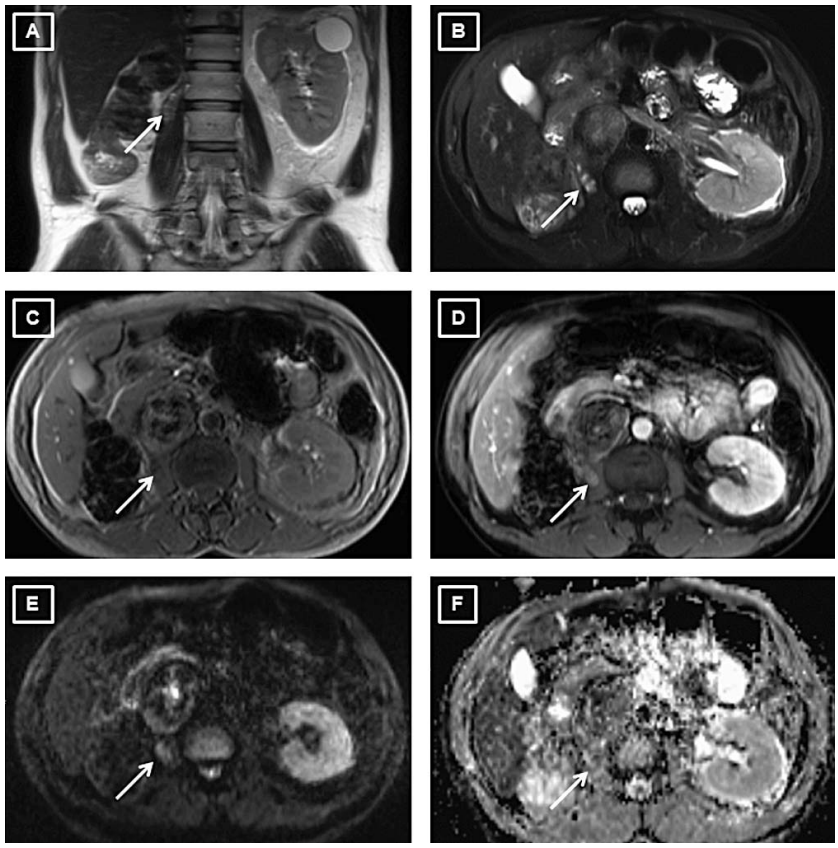

Fig. 1 MRI shows a lesion in the proximal portion of the right psoas muscle with high signal intensity on T2WI (A and B) and low signal intensity on T1WI (C). The lesion shows heterogeneous contrast enhanced pattern on postcontrast T1WI (D) and restricted diffusion on DWI (E and F).

decreased muscle tone and normal findings for all other qualities.

Radiographs of the abdomen and involved lower limb were normal. MRI revealed solid lesions in the proximal and middle portion of the right psoas muscle with low signal intensity, less than that for muscle, on T1-weighted images (T1WI) and high signal intensity on T2- weighted images (T2WI; Figs. 1 and 2). These lesions showed restricted diffusion on diffusion-weighted images (DWI) and heterogeneous contrast-enhanced pattern on postcontrast T1WI.

In addition, 2 lesions in the right paravertebral muscle at the level of fourth lumbar vertebra, and in the right gluteus medius muscle, respectively were determined by MRI. Both of these lesions also showed restricted diffusion on DWI and heterogeneous contrast enhanced pattern on postcontrast T1WI, just as the lesions in the right psoas muscle (Figs. 3 and 4). Oncologic MRI follow-up had been negative for the first three years. But multiple muscle metastases were diagnosed on magnetic resonance examination of abdomen at the fourth year, after radical nephrectomy. Thus, we decided that these lesions had metastatic pattern of RCC after radical nephrectomy and these metastatic lesions were confirmed by ultrasound-guided percutaneous biopsy.

Discussion

Metastatic carcinoma in skeletal muscle is rare, with an incidence that is between 1% and 6% of all metastases. The most common primary tumor sites are breast, colon, lung, and pancreas. The most common sites of metastasis of RCC are lung, lymph node, bone, and liver. Skeletal muscle is an extremely unusual site of metastasis for RCC, and the occurrence of metastases in patients with long-term survival after nephrectomy is also unusual.[2]

The reason for the rarity of metastasis in skeletal muscle is thought to be that protease inhibitors in the muscle extracellular matrix resist invasion by tumor enzymes, muscular contractions may dislodge the tumor cells, or the acidic conditions within the muscle produced by various metabolites may interfere with metastatic growth.[6]

Maintaining a high degree of suspicion of metastatic RCC is required for patients with a history of renal cell carcinoma. Positron emission

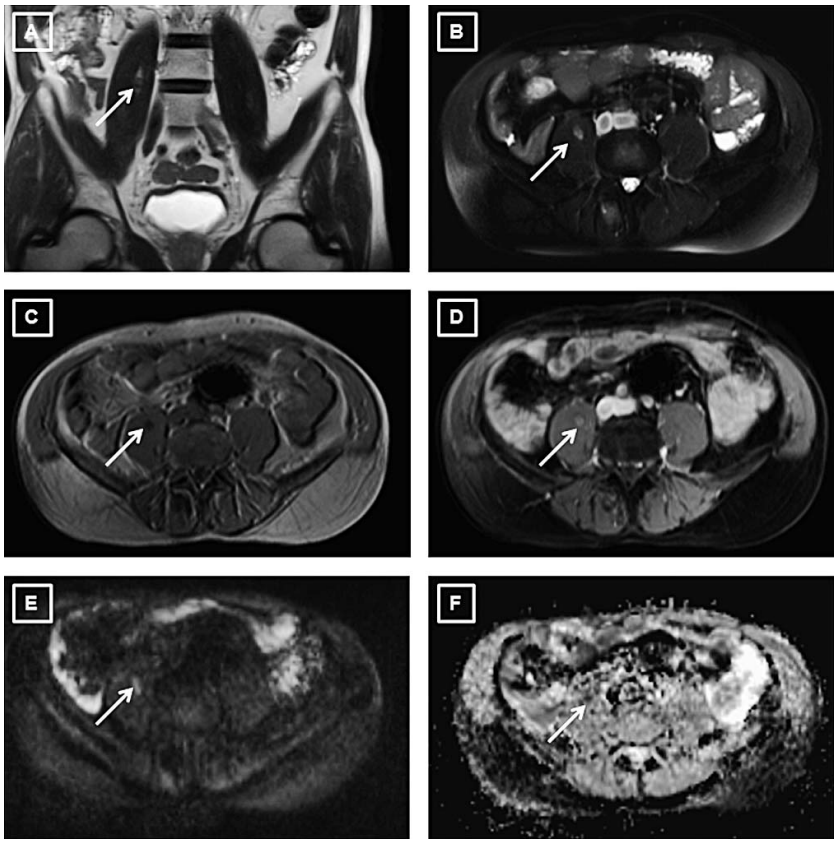

Fig. 2 MRI shows a lesion in the body of the right psoas muscle with high signal intensity on T2WI (A and B) and low signal intensity on T1WI (C). The lesion shows heterogeneous contrast enhanced pattern on postcontrast T1WI (D) and restricted diffusion on DWI (E and F).

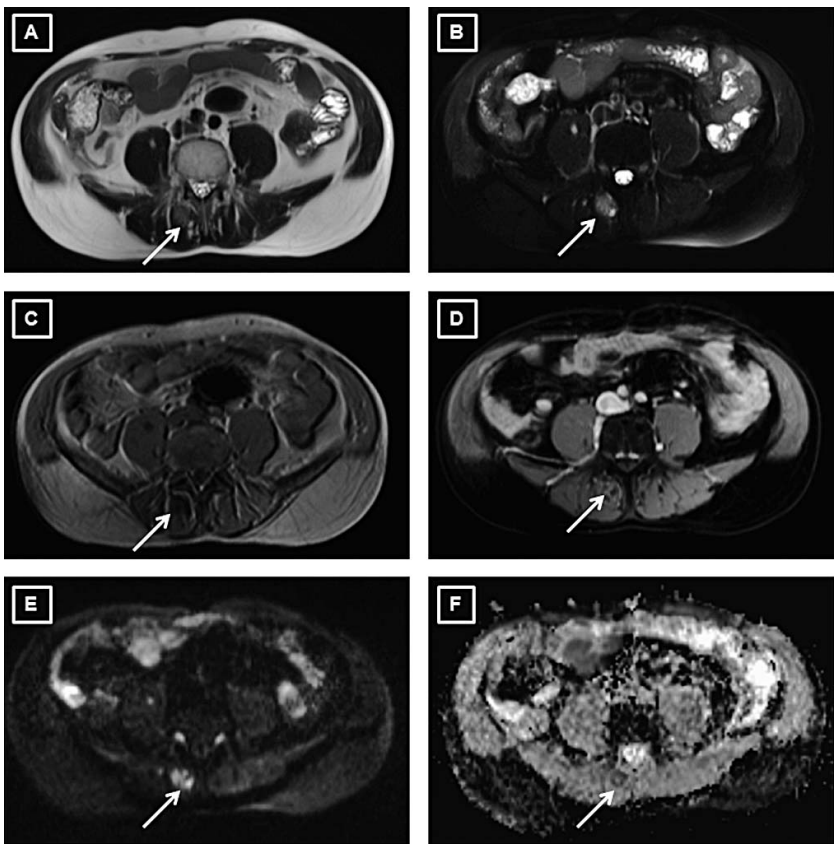

Fig. 3 MRI shows a lesion in the right paravertebral muscle with high signal intensity on T2WI (A and B) and low signal intensity on T1WI (C). The lesion shows heterogeneous contrast enhanced pattern on postcontrast T1WI (D) and restricted diffusion on DWI (E and F).

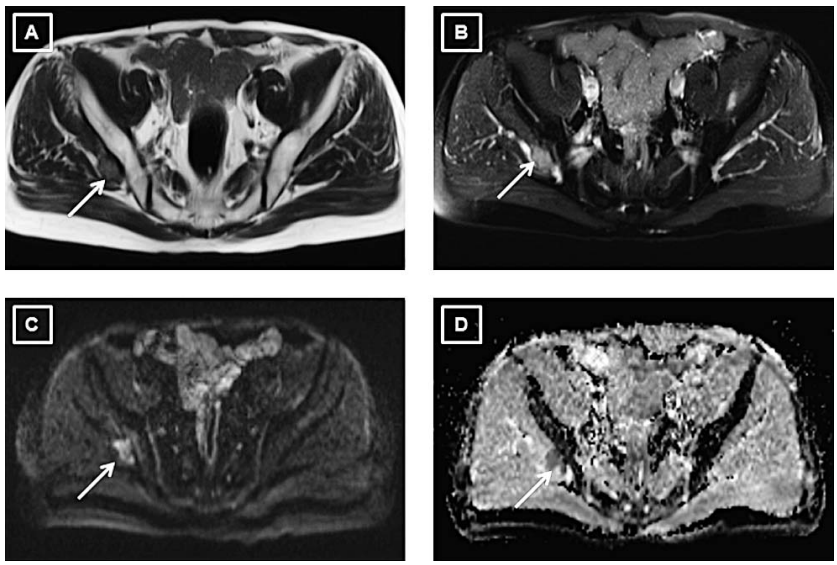

Fig. 4 MRI shows a lesion in the right gluteus medius muscle with high signal intensity on T2WI (A and B). On DWI, the lesion shows restricted diffusion (C and D).

tomography, combined with computed tomography and MRI, appears to be an effective surveillance tool. The correct diagnosis of metastatic renal cell carcinoma to skeletal muscle is difficult in comparison with soft tissue metastasis diagnosis. MRI is helpful in the differential diagnosis from primary soft tissue tumors.[7] Adding DWI to routine MRI may improve the accuracy of imaging metastatic lesions after nephrectomy, as in our case. Our case describes an unusual presentation of metastatic RCC to the ipsilateral skeletal muscles, emphasizing MRI findings 4 years after resection of the primary tumor. Picchio *et al*[7] reported that a case of skeletal muscle metastasis at the level of the left great adductor muscle, after 5 years total nephrectomy. Linn *et al*[3] reported the first case of psoas muscle metastasis 14 years after radical nephrectomy for an organ-confined RCC.

Methods for the postoperative follow-up of RCC have been well debated.[6,7] Lee *et al* reported prognostic discrimination for cause-specific survival after surgery for patients with RCC, based on the 2009 TNM classification. According to the 2009 classification, 5-year cause-specific survival was 83.2% in T2a, 83.8% in T2b, 62.6% in T3a, 41.1% in T3b, 50.0% in T3c, and 26.1% in T4.[8]

In conclusion, skeletal muscle metastasis of RCC is very rare. These unusual metastases may be seen after many years of radical nephrectomy. We believe that an annual MRI examination of the abdomen is advisable after radical nephrectomy for patients with RCC. Furthermore, the DWI should be added to routine conventional MRI for detecting the skeletal metastasis of RCC.

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