



## Case Report

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# Seeding Metastasis of Chromophobe Renal Cell Carcinoma after Robot-Assisted Laparoscopic Partial Nephrectomy

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Chromophobe renal cell carcinoma (RCC) is an uncommon subtype of RCC having a better prognosis than clear cell RCC. Although there are several reports of seeding metastasis of RCC after biopsy, seeding metastasis of chromophobe RCC after surgical resection has seldom been reported. Here, we describe a case of multiple seeding metastases in the abdomen and pelvis 78 months after robot-assisted laparoscopic partial nephrectomy, without prior history of biopsy for chromophobe RCC in the right kidney. As magnetic resonance imaging (MRI) of the pelvic mass showed a similar appearance to the primary renal mass and displayed separate margins with the rectum and prostate gland, we were able to make a diagnosis before pathologic confirmation.

**Keywords:** Chromophobe renal cell carcinoma; Seeding metastasis; Partial nephrectomy; Magnetic resonance imaging

## INTRODUCTION

Chromophobe renal cell carcinoma (RCC) is the third most common subtype, accounting for about 5% of all RCCs. As metastasis is rare in this subtype, chromophobe RCC has a more favorable prognosis than other RCC subtypes (1). Although seeding metastasis is very rare in RCC, several cases of metastasis have been reported, due to seeding of RCCs along the needle tract after biopsy (2). However, there has been no such report of metastasis in chromophobe RCC. Cases of seeding metastasis of RCC detected before or after resection of tumor have been reported previously (3). Although one case of chromophobe RCC with seeding metastasis was included in that article, timing of the diagnosis of seeding metastasis and surgical resection method were not specified. There is one report about seeding metastasis of papillary RCC after partial nephrectomy due to intraoperative disruption of hematoma, where a preoperative biopsy was performed.

In this study, we report a rare case of seeding metastasis of chromophobe RCC following robot-assisted laparoscopic partial nephrectomy without prior biopsy history. We further examine the role of magnetic resonance imaging (MRI) in differentiating metastases from pelvis tumors before surgery.

## CASE REPORT

A 71-year-old man presented with an acute urinary tract obstruction and difficulty defecating. The patient had a history of robot-assisted laparoscopic partial nephrectomy for chromophobe RCC in the right kidney, 78 months previously. The RCC was completely removed, and the pathologic stage was determined to be T1. There was no recurrence on follow-up computed tomography (CT) performed two years after surgery.

Upon presentation, abdominal and pelvic CT revealed an 11.4-cm-sized mass in the pelvic cavity. This lesion was thought to be the cause of the symptoms due to compression of the urinary bladder and rectum. The lesion had a lobulated contour with heterogeneous enhancement, and a non-enhancing portion in the center. A second similar tumor, 5.6 cm in size, was found near the gastric antrum in the right upper quadrant (RUQ) of the abdomen (Fig. 1). As the pelvic mass was located between the urinary bladder and rectum, and the prostate gland was not visible on the CT scan, we suspected that the mass originated from the prostate gland or the exophytic rectal mass. The RUQ mass was thus considered to be a seeding metastasis from the pelvic mass.

Evaluating further, a pelvic MRI was performed using a 3-T MRI unit (MAGNETOM Verio, Siemens Healthcare, Erlangen, Germany). The pelvic mass had a lobulated contour and heterogeneous signal intensities (SIs), which

were low in the peripheral portion (similar to the signal intensities of the muscles), and high in the central portion on T2-weighted imaging (T2WI). A thin, low-signal intensity capsule surrounded the mass. On contrast-enhanced T1-weighted imaging (T1WI), the mass showed spoke-wheel-like enhancement at the peripheral T2-low SI portion, with no enhancement at the central T2-high SI area. The peripheral solid portion of the tumor showed high SI on diffusion-weighted imaging (DWI) and a low apparent diffusion coefficient (ADC) value. Sagittal images showed that the mass was clearly distinguished from the anteriorly displaced prostate gland and posteriorly displaced rectum (Fig. 2). As MRI of the kidney had been performed before the partial nephrectomy, we were able to compare characteristics of the resected RCC and those of the newly developed pelvic mass. The primary RCC had a similar SI to the muscle lower than the renal parenchyma, with central high SI and a thin low SI capsule on T2WI. A linear enhancement extending from the central portion with the spoke-wheel appearance was noted on contrast-enhanced T1WI (Fig. 3). We strongly suspected the possibility of seeding metastasis of the primary chromophobe RCC to the pelvic cavity, despite the extremely low incidence, since very similar MRI findings were observed in the primary RCC and the newly noted pelvic mass.

To confirm this diagnosis with histopathology, an ultrasound-guided transrectal biopsy was performed. Hematoxylin & Eosin (HE) staining showed typical features

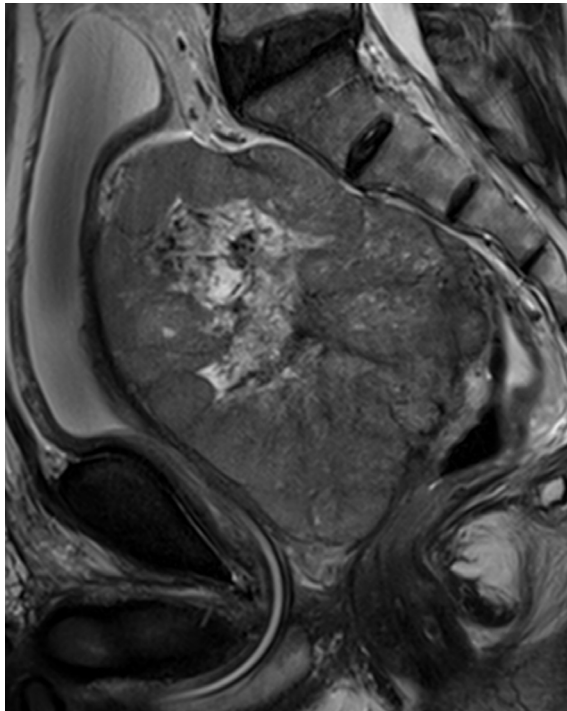


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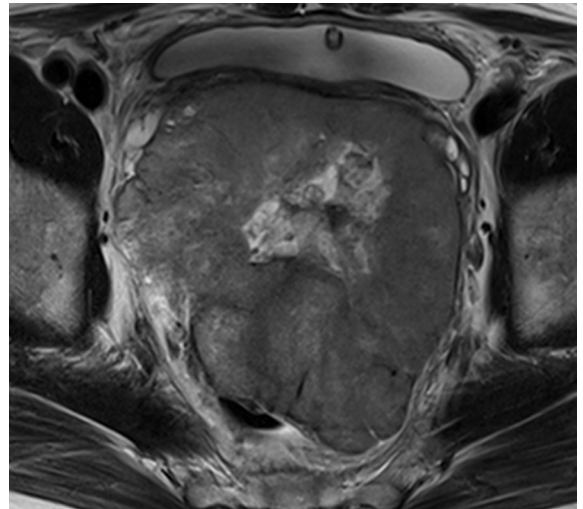


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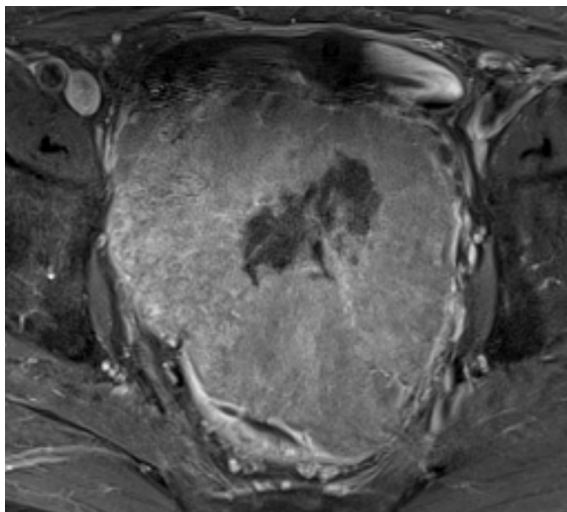
**Fig. 1.** A 71-year-old man with an 11.4-cm-sized mass in the pelvic cavity. (a) Pelvic CT scan showed a mass with lobulated contour with heterogeneous enhancement and a non-enhancing portion in the center. The mass compressed the urinary bladder and the rectum. (b) Abdominal CT scan showed another similar mass (arrow) in the right upper quadrant (RUQ) of the abdomen.



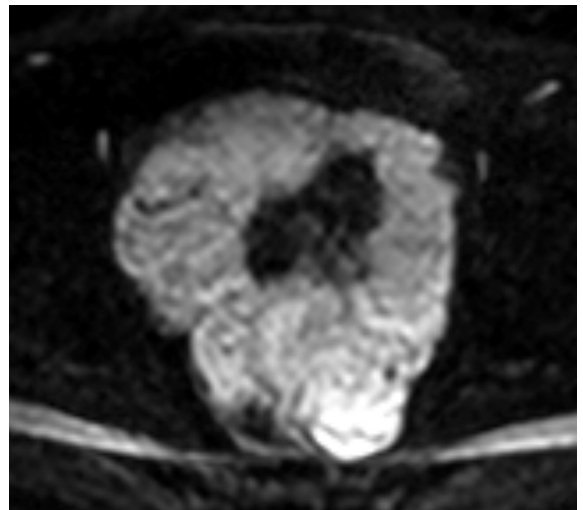
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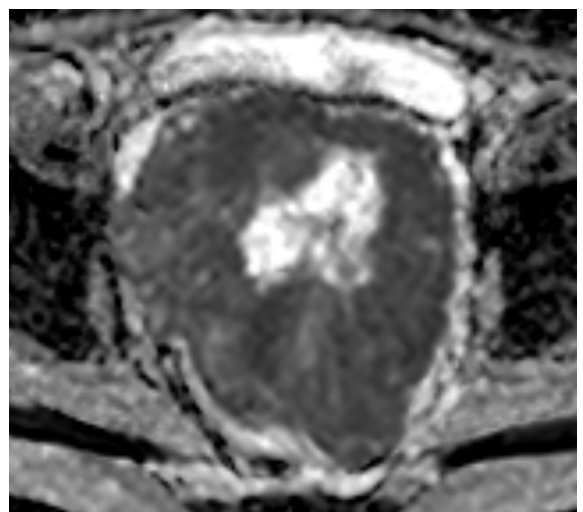
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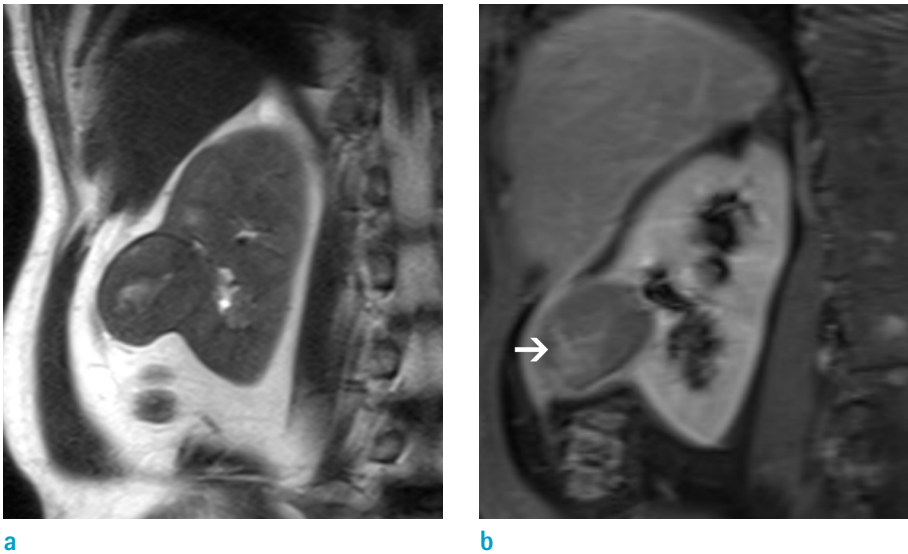


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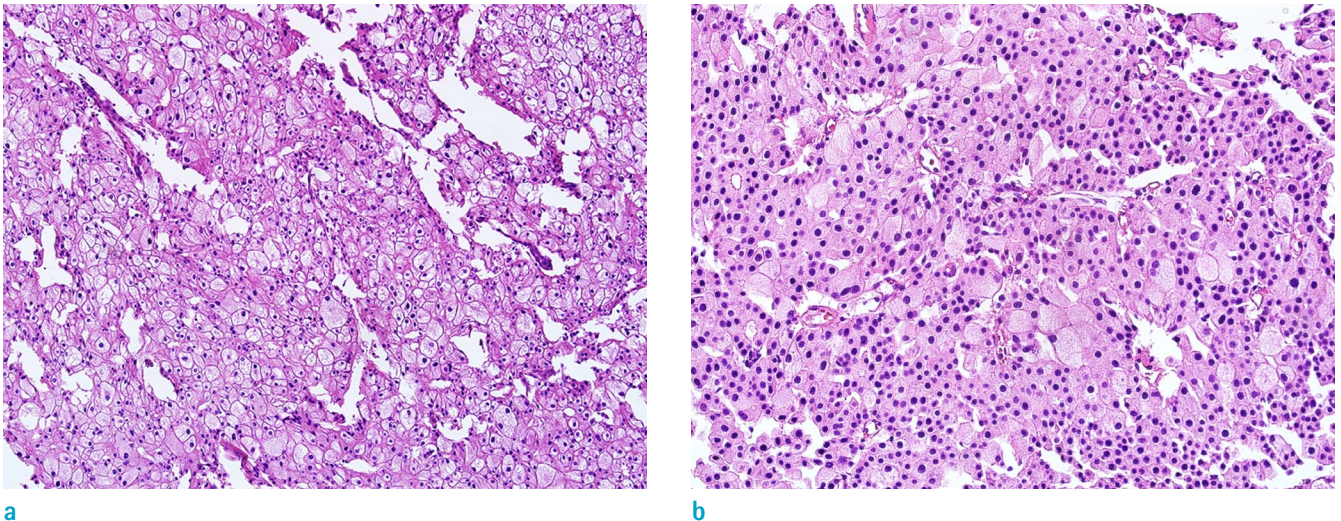


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**Fig. 2.** A 71-year-old man with an 11.4-cm-sized mass in the pelvic cavity. (a) T2-weighted sagittal image showed that a huge mass compressed the prostate gland, whereas the rectum had a clear margin. (b) T2-weighted axial image showed low signal intensity in peripheral portion and high signal intensity in central portion of the mass, with thin low signal intensity capsule. (c) Contrast-enhanced T1-weighted axial image displayed heterogeneous enhancement of the mass. Diffusion-weighted image (d) and apparent diffusion coefficient (ADC) map (e) showed definite diffusion restriction in peripheral solid portion.



**Fig. 3.** Initial MRI of right kidney mass that was confirmed as chromophobe renal cell carcinoma. The mass showed lower signal intensity than the renal parenchyma, with a central high signal intensity portion and thin low signal intensity capsule, on T2-weighted coronal image (a). Contrast-enhanced T1-weighted coronal image (b) showed the spoke-wheel-like enhancement in the mass (arrow).



**Fig. 4.** The specimens obtained by partial resection of right kidney (a) and ultrasound-guided transrectal biopsy (b). The tumor showed typical features of chromophobe RCC, including pale eosinophilic cytoplasm with distinct cell membranes and perinuclear halos (Hematoxylin & Eosin staining,  $\times 400$ ).

of chromophobe RCC, including pale eosinophilic cytoplasm with distinct cell membranes and perinuclear halos. The pathologic features of the biopsied tissue were identical to those of the primary chromophobe RCC (Fig. 4). Two seeding metastases were surgically removed, and no recurrence was detected six months after surgery.

## DISCUSSION

RCC encapsulates the majority of malignant kidney

tumors in adults. There are varying subtypes of RCC, based on their histological findings, anatomical location, and molecular alterations (4). The most common subtypes are clear cell, papillary, and chromophobe RCCs, which represent 70%, 10–15%, and 5% of all RCC cases, respectively. The chromophobe subtype has a better prognosis than clear cell RCC. RCC usually metastasizes to the lung, bone, lymph node, liver, adrenal gland, and brain through hematogenous and lymphatic pathways (5). Seeding metastases of RCC are rare, with a previous study reporting merely 1% incidence of seeding metastasis of RCC (25 cases of metastasis of

2561 patients with RCC); there has been only one reported case of chromophobe RCC with seeding metastasis (3). These seeding metastases were detected within five months of the median interval after surgery, and most of them were located on the ipsilateral side of the nephrectomy.

Several cases of seeding metastasis of RCC along the biopsy needle tract, and seeding metastasis or port site metastases after laparoscopic urological surgery, have rarely been reported (2, 6-8). High grade and high stage of tumor probably has a role in tumor seeding. Seeding metastasis after laparoscopic surgery for RCC is rarer than urothelial cell carcinoma, especially in cases of T1 pathologic stage or chromophobe RCC (3, 8-10). Although the mass in the RUQ area in our report could be a port site metastasis, the pelvic mass was not a port site metastasis. As partial nephrectomy could be achieved without morcellation in our case, chances of seeding metastasis by tumor cell dissemination was extremely low. Moreover, to the best of our knowledge, there are no reported cases of seeding metastasis presenting as a well-defined, large pelvic mass after resection of chromophobe RCC. Here, we describe the MRI findings of a mass-forming seeding metastasis of chromophobe RCC after robot-assisted laparoscopic partial nephrectomy.

In our case, the MRI was very useful for differential diagnosis of the pelvic mass. On CT, the pelvic mass was initially considered to be a primary tumor, and the RUQ mass as a seeding metastasis, despite the fact that the patient underwent surgery for RCC, in which a seeding metastasis is extremely rare. Differential diagnoses of the huge pelvic mass located posterior to the urinary bladder included unusual prostate sarcoma and exophytic submucosal rectal mass, such as gastrointestinal stromal tumor (GIST). MRI was beneficial over CT in two ways. First, we could determine the relationship of the tumor with adjacent organs. The prostate gland, which could not be delineated on CT, was clearly visible on MRI and was found to be flattened by the pelvic mass with a distinct margin. The rectum was posteriorly displaced by the tumor, but retained an intact rectal wall. Second, the characteristics of the pelvic mass could be compared with the initial MRI findings of the primary RCC. The pelvic mass exhibited a very similar appearance to the primary RCC, including a lobulated contour, a low peripheral T2-SI with a high central SI, a thin T2-low SI capsule, and spoke-wheel-like enhancement. These data provide evidence for the occurrence of an extremely rare seeding metastasis from a primary RCC.

Different subtypes of kidney masses have distinct MRI

features. Chromophobe RCC usually have a heterogeneous hyper- or iso-signal intensity to the renal medulla on T2WI (11). The common imaging features of chromophobe RCC include a peripheral location, a well-circumscribed margin, and hypovascularity relative to the renal cortex (12). Two different enhancement patterns of chromophobe RCC were discovered in a study on enhancement of renal tumors: 1) lower enhancement than the renal medulla in the corticomedullary phase with spoke-wheel-like enhancement, and 2) hyper-enhancement in the corticomedullary phase (11). In our case, the primary RCC and pelvic mass commonly showed lower enhancement than the renal medulla, as well as other typical imaging findings of chromophobe RCC.

The well-circumscribed margin of the seeding mass in our case was different from a previous study that showed ill-defined margins of seeding metastases of RCC (3). It is also remarkable that the interval between surgical resection of the primary RCC and detection of the seeding metastasis was much longer, and the size of the metastasis was much larger than previously reported. These features could be explained by the lack of follow-up CT more than two years after surgery, and the relatively indolent behavior of chromophobe RCC compared to other subtypes. The pelvic seeding metastasis seemed to grow slowly, with compression and displacement of adjacent organs rather than invasion.

In conclusion, we report a rare case of a seeding metastasis of chromophobe RCC presenting as a large pelvic mass after robot-assisted laparoscopic partial nephrectomy. Given its high soft tissue contrast, MRI proved useful for diagnosis; the characteristic features of the new mass were found to be similar to those of the primary RCC. Awareness of the utility of MRI in diagnosing these rare seeding metastases might prevent misdiagnosis and allow for proper tumor management.

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