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Case Report

A case of renomedullary interstitial cell tumor: Radiologic-pathologic correlation ☆,☆☆

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ABSTRACT

Renomedullary interstitial cell tumor (RMICT), referred to as a medullary fibroma, is almost always asymptomatic and incidentally identified either at autopsy or upon resection of the kidney for other reasons. Although a few cases of RMICTs that are large in size and clinically symptomatic have been reported, there are few reports of RMICTs contrasting imaging findings with pathological findings. In this report, we describe a relatively large RMICT case of 3 cm in size, focusing on the radiologic-pathologic correlation.

Introduction

Renomedullary interstitial cell tumor (RMICT), formerly known as medullary fibroma, was first described by Lerman et al. in 1972 [1]. RMICT is almost always asymptomatic and incidentally identified either at autopsy or upon resection of the kidney for other reasons. RMICT arises from renomedullary interstitial cells, which plays a role in the release of renin and regulate sodium excretion. Although most RMICTs are 1-7 mm in diameter [1], rare cases that are large or clinically present as a mass lesion have been reported. As RMICT is small and often asymptomatic, it is rarely a target for imaging studies and surgical operation. In particular, there are few reports describing the imaging findings of RMICT. Our present case of RMICT is 3 cm in diameter which was difficult to distinguish from renal malignancy preoperatively. In this case report, we review the radiologic-pathologic correlation of RMICT case and discuss the differences in imaging features between other renal tumors and RMICT.

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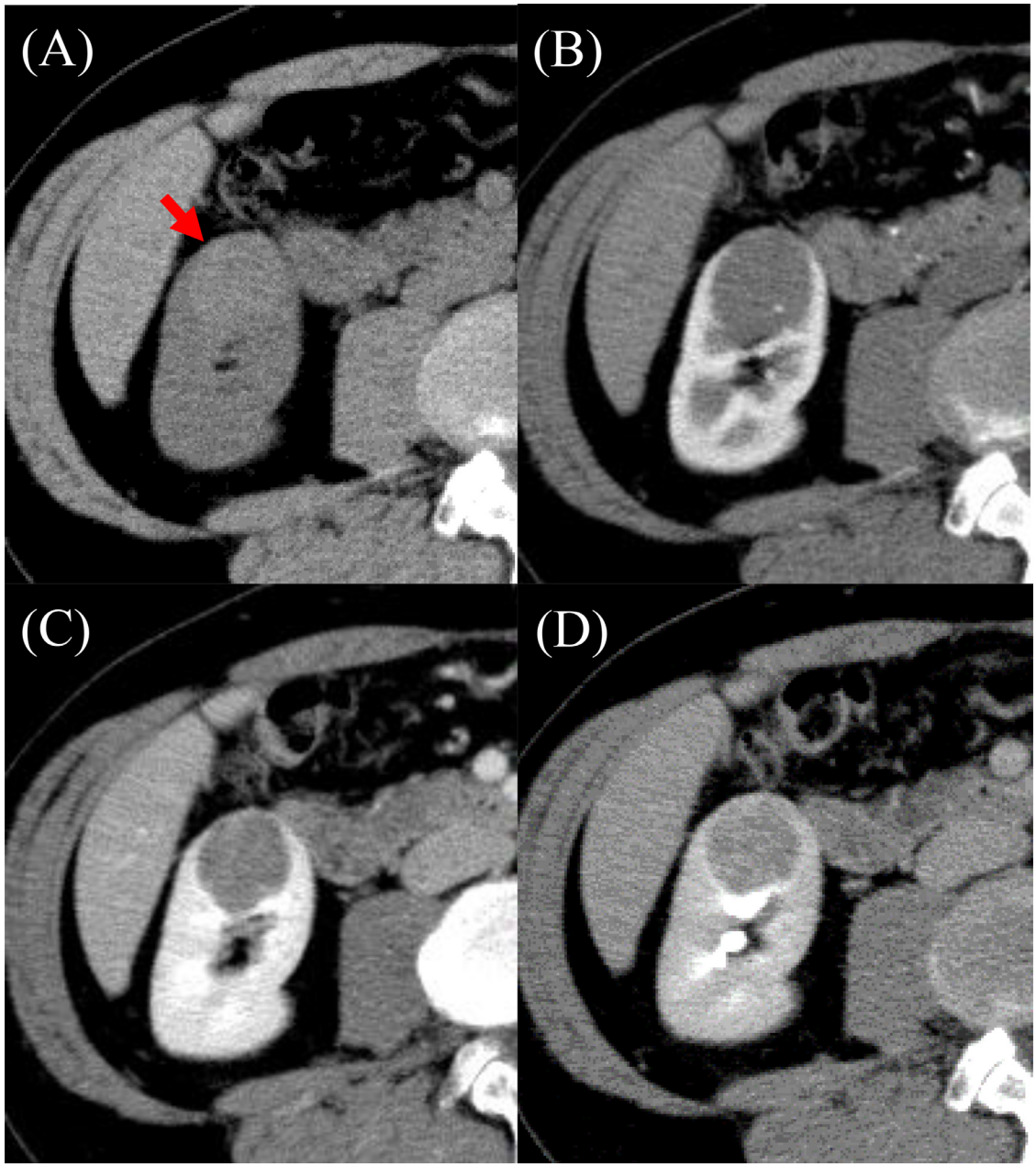

Fig. 1 – Computed tomographic findings. (A) Plain CT demonstrated a 30 x 28 x 25 mm, homogeneously slight hyperattenuating right renal mass (CT number 49 HU; arrow). (B-D) Dynamic contrast-enhanced CT demonstrated a slight, gradual and heterogeneous enhancement in the mass without fat, calcification, or cystic elements.

Case report

A 57-year-old man was referred to our hospital for the treatment of acute appendicitis. During his assessment, an incidental left renal mass was detected using computed tomography (CT). After the treatment of the acute appendicitis, the renal mass resection was considered.

The patient had reported no symptoms and showed no clinical signs. No apparent abnormalities were observed in blood test findings. Plain CT demonstrated a 30 × 28 × 25 mm, homogeneously slight hyperattenuating right renal mass (CT number 49 HU; arrow) (Fig. 1A). Dynamic contrast-enhanced CT demonstrated a slight, gradual and homogeneous enhancement in the mass without fat, calcification, or cystic elements (Figs. 1B-D).

T2-weighted image (T2WI) (Fig. 2A) showed homogeneous low signal intensity in the mass (arrow). Fat-suppressed T2-weighted image (Fig. 2B) shows low signal and contains internal areas of mildly high signal intensity in the mass. There is no obvious capsular structure. Diffusion-weighted image (DWI) (Fig. 2C) showed homogeneous low signal intensity in the mass (arrow). Apparent diffusion coefficient (ADC) map (D) showed high signal intensity in the mass. Dynamic contrast-

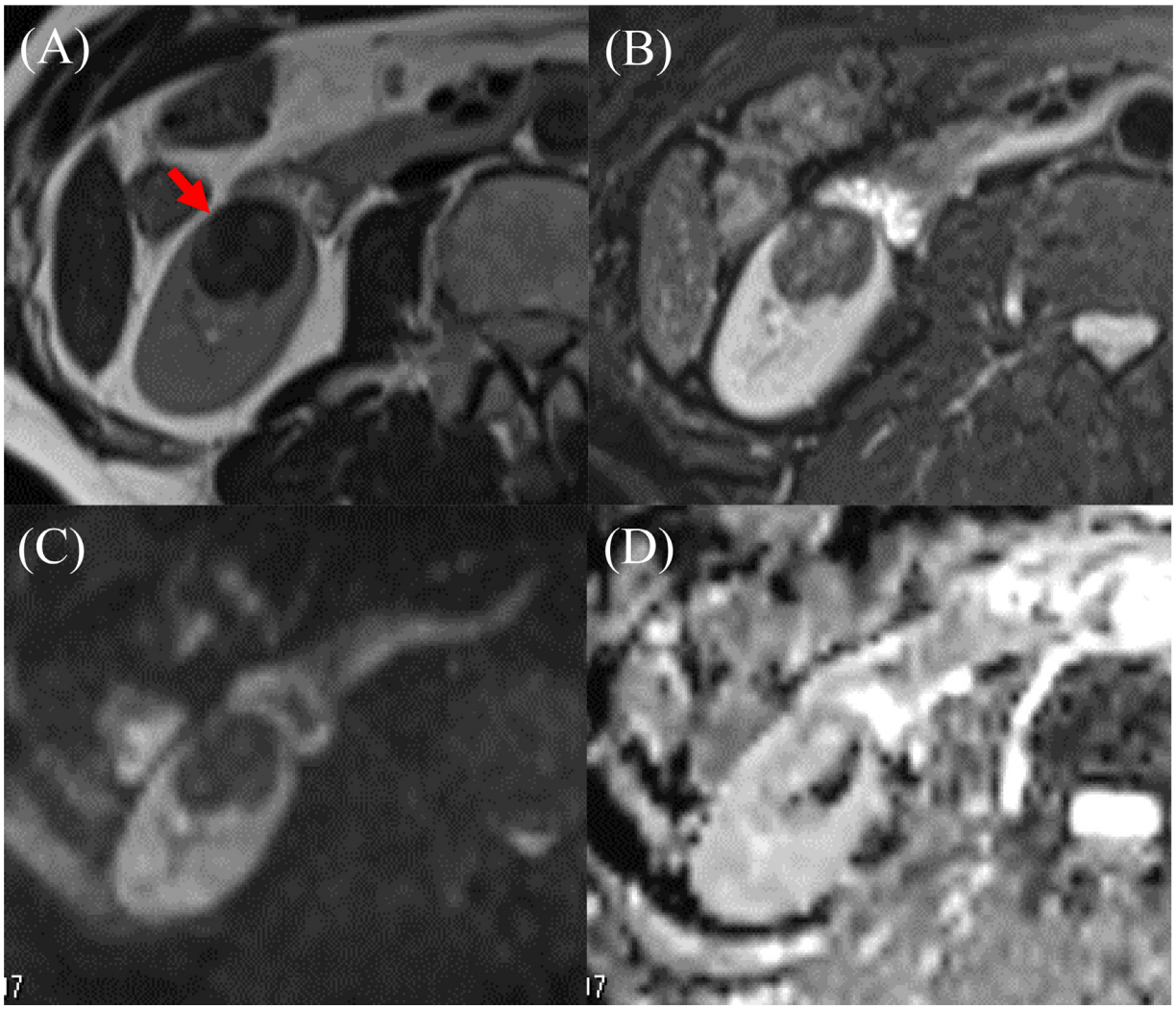

Fig. 2 – Magnetic resonance imaging findings. T2-weighted image (A) showed homogeneous low signal intensity in the mass (arrow). Fat-suppressed T2-weighted image (B) shows low signal and contains internal areas of mildly high signal intensity in the mass. There is no obvious capsular structure. Diffusion-weighted image (C) showed homogeneous low signal intensity in the mass (arrow). Apparent diffusion coefficient (ADC) map (D) showed high signal intensity in the mass.

enhanced MRI (Figs. 3A-D) demonstrated a slight, gradual and homogeneous enhancement in the mass.

The preoperative differential diagnosis was fat poor angiomyolipoma (AML), because of the low signal intensity on T2WI, hypovascular enhanced pattern on dynamic contrast-enhanced CT or MRI, and no diffusion restriction on MRI. Papillary renal cell carcinoma (PRCC) was also listed in the differential diagnosis, but no diffusion restriction on MRI was atypical for PRCC.

Robot-assisted laparoscopic partial nephrectomy was performed for right renal mass. Surgical exploration revealed a well-circumscribed right renal mass of 3 cm that varied in color from yellow to white, and was located in the renal medulla (Fig. 4).

Microscopic examination of the mass revealed that hematoxylin and eosin staining (Fig. 5A: 40× magnification, Fig. 5B: 400× magnification) showed a neoplastic lesion consisting of short spindle-shaped cells, with blood vessels and renal tubules. Demarcation of the tumor was clear and no capsule was recognized. Immunohistochemistry showed that the tumor was positive for Massonn's Trichrome (Fig. 5C: 400× magnification) and was negative for HMB-45 (Fig. 5D: 400× magnification). The pathologic diagnosis was RMICT.

Discussion

We experienced a case of RMICT, which was relatively large at 3 cm in size, and its pathological findings could be compared with imaging findings such as dynamic contrast-enhanced CT and MRI. There have been no comprehensive reports on imaging findings for RMICT, because most RMICTs are small in size, asymptomatic, and rarely subject to imaging studies and surgical treatment.

RMICT is a tumor derived from renomedullary interstitial cells in the renal medulla. Renomedullary interstitial cells produce prostaglandins and are involved in blood pressure regu-

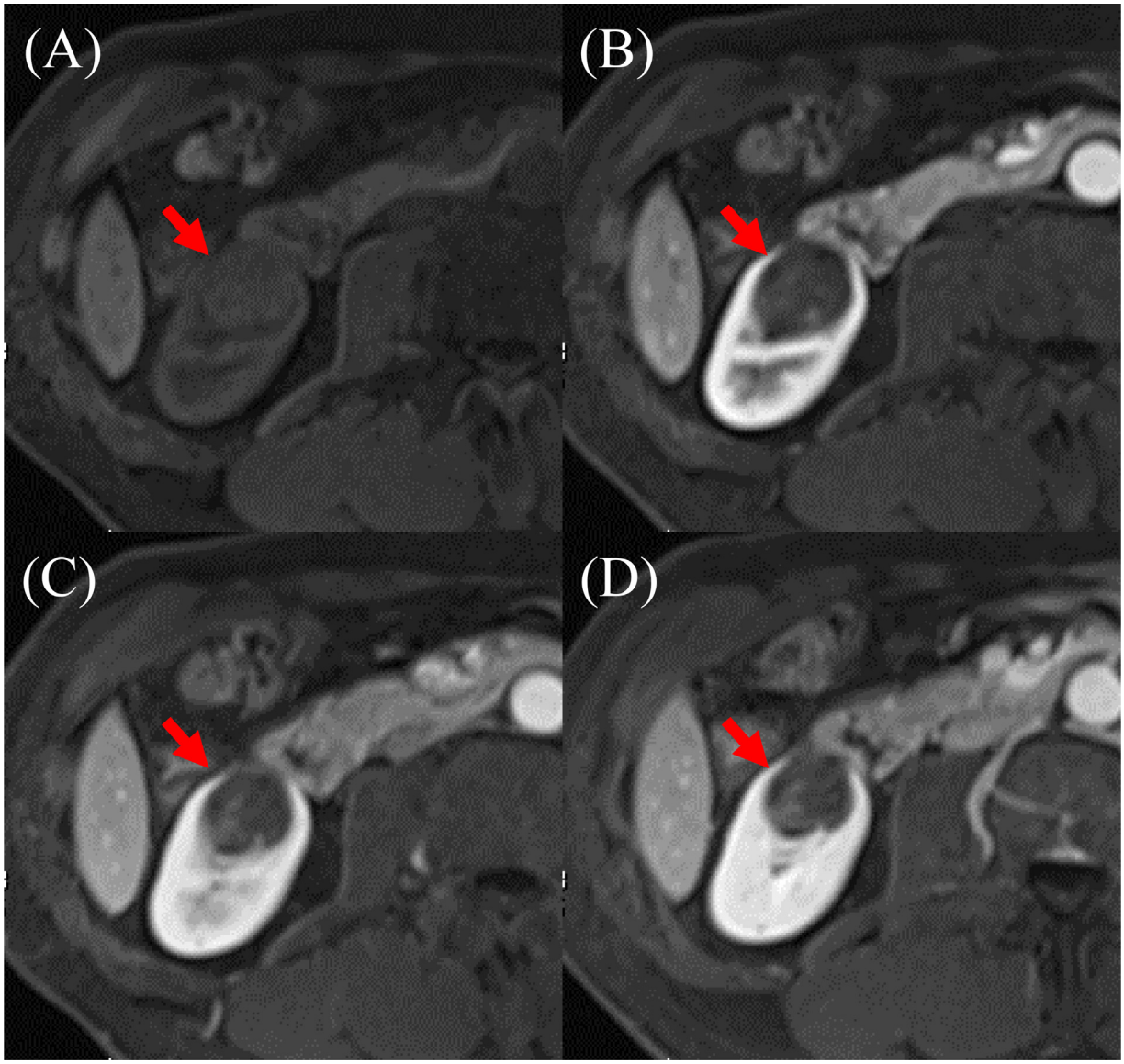

Fig. 3 – Dynamic contrast-enhanced magnetic resonance imaging (MRI) findings. (A: precontrast T1-weighted image, B-D: dynamic-contrast T1-weighted image). Dynamic contrast-enhanced MRI demonstrated a slight, gradual and homogeneous enhancement in the mass.

lation. RMICT is found incidentally in 16%-42% of adult autopsied cases, with an average age of 57 years (24-83) [2]. The pathological appearance of RMICT is characterized by abundant fibrous components and low cell density [3]. Calcification is not usually seen.

Because RMICT originates from the medullary interstitial cells, most RMICTs were located in the renal medulla. Wassim et al. [4] reported that the location of the tumors was medullary (0-9 mm from the collecting system) in 8 of 10 patients. This finding would potentially aid in radiographic diagnosis for the tumors originating from the renal cortex such as renal cell carcinoma.

Reflecting the pathological abundant fibrous components and low cell density, dynamic contrast-enhanced CT and MRI demonstrates a slight and gradual enhancement with low signal intensity on both T2WI and DWI in the present case. Furthermore, in the present case, the tumor was close to the collecting duct, suggesting a renal medullary origin. Except for the large size, the present case was consistent with previous RMICT reports.

Preoperative diagnosis of RMICT is difficult. Present case of RMICT showed slight enhancement on dynamic contrast-enhanced CT or MRI, and low signal intensity on T2WI of MRI. These imaging findings suggest the inclusion of abundant fibrous components within the mass. Therefore, it is difficult to differentiate from fat poor AML with similar pathologic features. The key images of differential diagnosis are DWI and ADC map on MRI. On DWI, the signal intensity of AML depends on the amount of fat. On fat poor AML, diffusion restriction increases, because decreasing fat and increasing muscle in AML

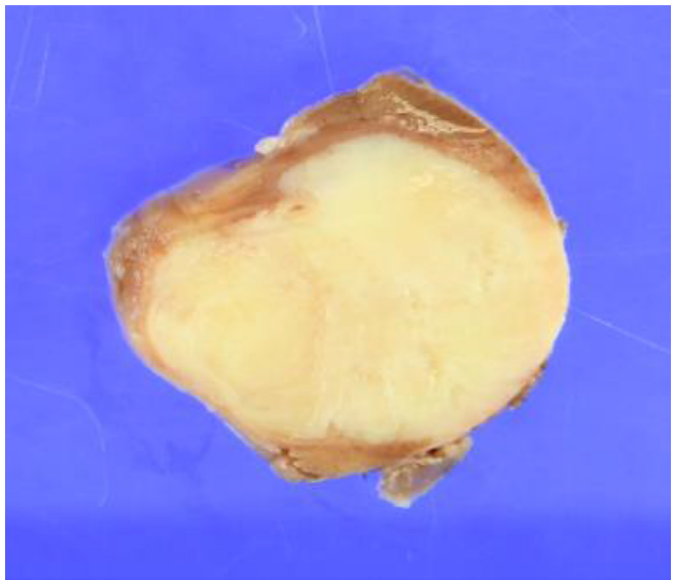

Fig. 4 – Macroscopic findings. Surgical exploration revealed a well-circumscribed right renal mass of 3 cm that varied in color from yellow to white, and was located in the renal medulla.

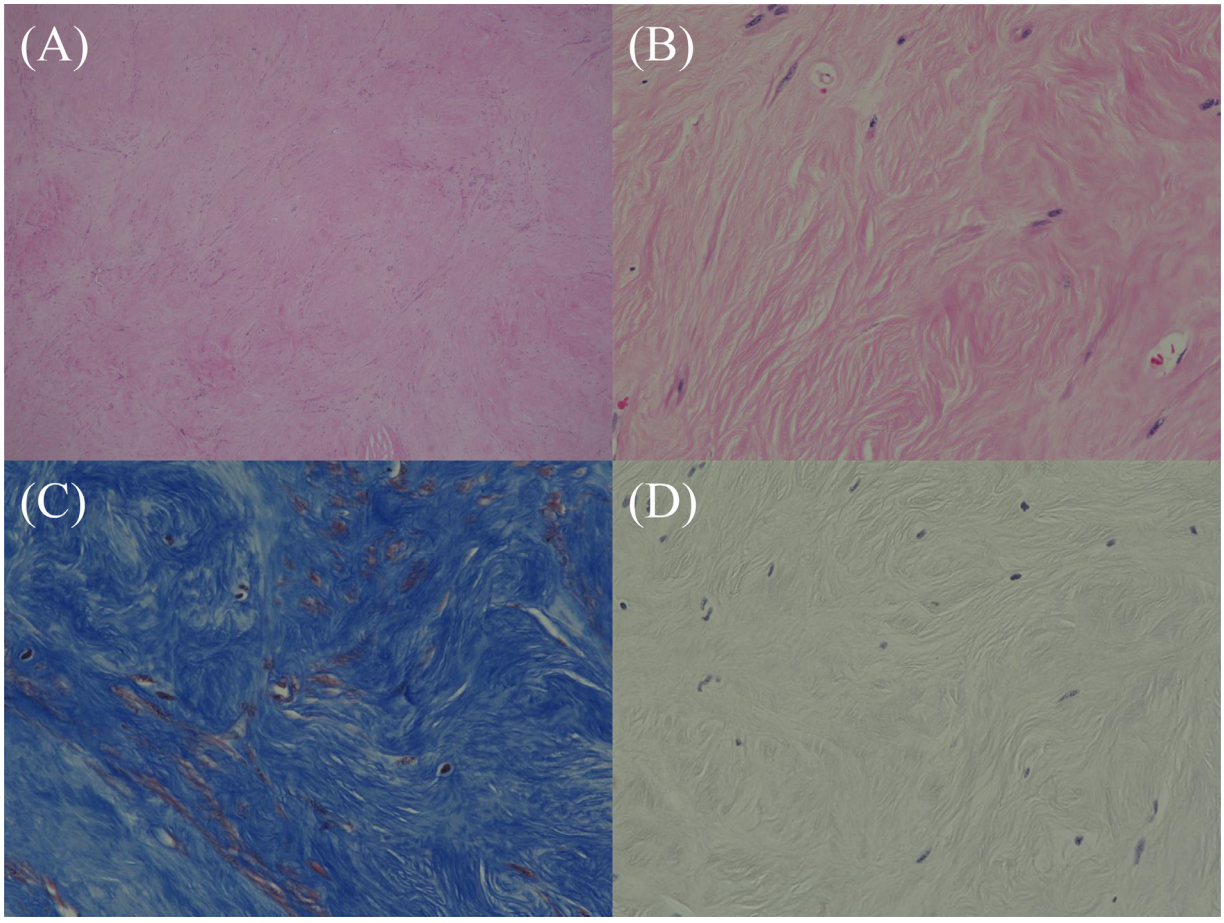

Fig. 5 – Pathologic findings. Hematoxylin and eosin staining (A: 40× magnification, B: 400× magnification) showed a neoplastic lesion consisting of short spindle-shaped cells, with blood vessels and renal tubules. Demarcation of the tumor was clear and no capsule was recognized. Immunohistochemistry showed that the tumor was positive for Massonn's Trichrome (C: 400× magnification) and was negative for HMB-45 (D: 400× magnification).

may increase tumor cellularity, resulting in increasing diffusion restriction [5]. Therefore, fat poor AML is hyperintense on DWI. On the other hand, RMICT is less diffusion-restricted due to lower cell density.

Distinguishing RMICT from PRCC is also difficult, because imaging findings of PRCC and RMICT are very similar. PRCC typically presents low signal on T2WI, similar to RMICT, making it difficult to differentiate. But PRCC, like fat poor AML, also has a high signal on DWI due to high cell density and a low ADC value [6]. This is useful in differentiating PRCC from RMICT. PRCC also shows pseudocapsule surrounding the mass, which appears as a low signal intensity at the peripheral area of the mass on T2WI. However, RMICT in our case did not show pseudocapsule radiologically or pathologically as with previous reports.

In conclusion, we report the case of relatively large RMICT of 3 cm in size mainly on the radiologic-pathologic correlation. RMICT contains abundant fibrous components and low cell density, and its histologic features are reflected in imaging findings. Therefore, dynamic contrast-enhanced CT presents hypovascular enhanced renal mass, and T2WI and DWI on MRI shows a low signal intensity due to low cell density.

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Patient consent

Written informed consent was obtained from the patient for publication of this case.

REFERENCES

[1] Lerman RJ, Pitcock JA, Stephenson P, Muirhead EE. Renomedullary interstitial cell tumor (formerly fibroma of renal medulla). Hum Pathol 1972;3:559–68.
[2] Lu Z, Al-Obaidy K, Cheng L, Perry KD, Grignon DJ, Williamson SR. Immunohistochemical characteristics of renomedullary interstitial cell tumor: a study of 41 tumors with emphasis on differential diagnosis of mesenchymal neoplasms. Hum Pathol 2018;82:46–50.
[3] Cormier P, Patel SK, Turner DA, Hoeksema J. MR imaging findings in renal medullary fibroma. Am J Roentgenol 1989;153:83–4.
[4] Bazzi WM, Huang H, Al-Ahmadie H, Russo P. Clinicopathologic features of renomedullary interstitial cell tumor presenting as the main solid renal mass. Urology 2014;83:1104–6.
[5] Tanaka H, Yoshida S, Fujii Y, Ishii C, Tanaka H, Koga F, et al. Diffusion-weighted magnetic resonance imaging in the differentiation of angiomyolipoma with minimal fat from clear cell renal cell carcinoma. Int J Urol 2011;18:727–30.
[6] Wang H, Cheng L, Zhang X, Wang D, Guo A, Gao Y, et al. Renal cell carcinoma: diffusion-weighted MR imaging for subtype differentiation at 3.0 T. Radiology 2010;257:135–43.