Case Report

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MRI Findings of Renal Myxoma: A Case Report and Literature Review

신장 점액종의 MRI 소견: 증례 보고와 문헌고찰

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Renal myxomas are very rare benign tumors. To date, a few cases have been reported in English literature, mostly in pathology and urology journals. Thus, there are few reports on the radiological findings associated with renal myxomas. We report on the imaging findings in a case of renal myxoma in a 62-year-old male. MRI demonstrated a well-defined mass in the left renal sinus, with intermediate high signal intensity on T2-weighted images and low signal intensity on T1-weighted images. The tumor showed gradual enhancement on contrast-enhanced T1-weighted images.

Index terms Myxoma; Kidney; Magnetic Resonance Imaging

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INTRODUCTION

Myxoma is a rare benign mesenchymal tumor. It is composed of fibroblast-like spindle cells and abundant myxoid stroma (1). This tumor occurs in the skin, heart, soft tissue, head, and neck. Renal myxoma is rare, so there are a few case reports describing the radiologic findings related to these tumors. We report the radiographic findings of a renal myxoma, with a focus on MRI findings. We have also summarized the cases reported so far.

CASE REPORT

A 62-year-old male presented with left flank pain and gross hematuria that had started 2 months previously. He had a medical history of hypertension only. Except for the mildly elevated erythrocyte sedimentation rate and red blood cells found on urine analysis, the results of the laboratory tests were within normal ranges. The patient had

undergone abdominal CT in an external hospital. A 5.0 cm-sized iso-attenuated mass was noted in the hilum of the left kidney on pre-contrast CT (Fig. 1A). The tumor showed mild homogenous enhancement during the portal phase, and gradual enhancement on 3-minute delayed phase imaging. For a more accurate diagnosis, kidney MRI was performed in our hospital. The tumor showed intermediate to high signal intensity on T2-weighted image (T2WI), without diffusion restriction (Fig. 1B). The tumor extended to the renal sinus and the periureteric space. On dynamic studies, the tumor also depicted persistent gradual enhancement. There was a focal high signal intensity lesion in the proximal ureter on T1-weighted image (T1WI), which was suggestive of hematoma. The image findings suggested a renal sinus tumor, but the treating physician also suspected an unusual type of renal cell carcinoma (RCC), such as papillary RCC (pRCC), or the possibility of urothelial carcinoma. This suspicion was due to the tumor location and the presence of gross hematuria. Thus, left nephroureterectomy was performed. There was a well-defined solid tumor in the renal hilum, with a protruding renal pelvis and proximal ureter found intraoperatively. The tumor was identified histopathologically as myxoma that originated from the renal sinus and did not invade the renal parenchyma (Fig. 1C). No tumorous or inflammatory lesion was found in the left renal pelvis or ureter, except for hematoma. Regular follow-ups were performed after sur-

Fig. 1. Imaging and pathologic features of renal myxoma in a 62-year-old male.
A. The multiphase pre- and post-contrast enhanced CT images show an iso-attenuated mass (arrows) in the left renal hilum in the pre-contrast image with homogenous gradual enhancement in portal and delayed phases.
B, C. MR images reveal a well-defined 5.0 cm mass (arrows) in the left renal hilum with intermediate high signal intensity on a fat-suppressed T2-weighted image which extends to the renal sinus and periureteral space without parenchymal invasion (open arrow), and shows a slightly high signal intensity on diffusion weighted image, but no significant restriction on apparent diffusion coefficient, with slightly lower signal intensity in the renal sinus compared with the renal cortex, and an associated hematoma in the left proximal ureter (arrowhead) on the T1-weighted image, mild enhancement on the arterial phase, and gradual homogenous enhancement pattern on the portal and delayed phases.

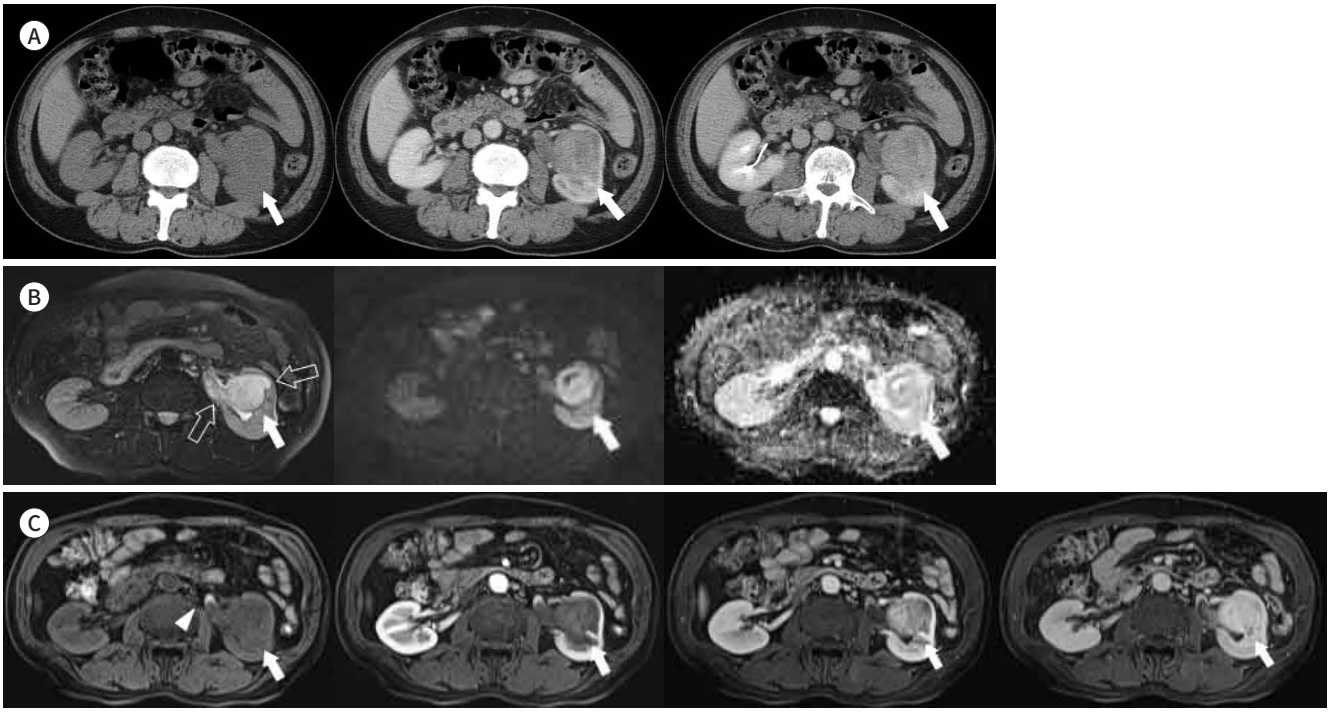
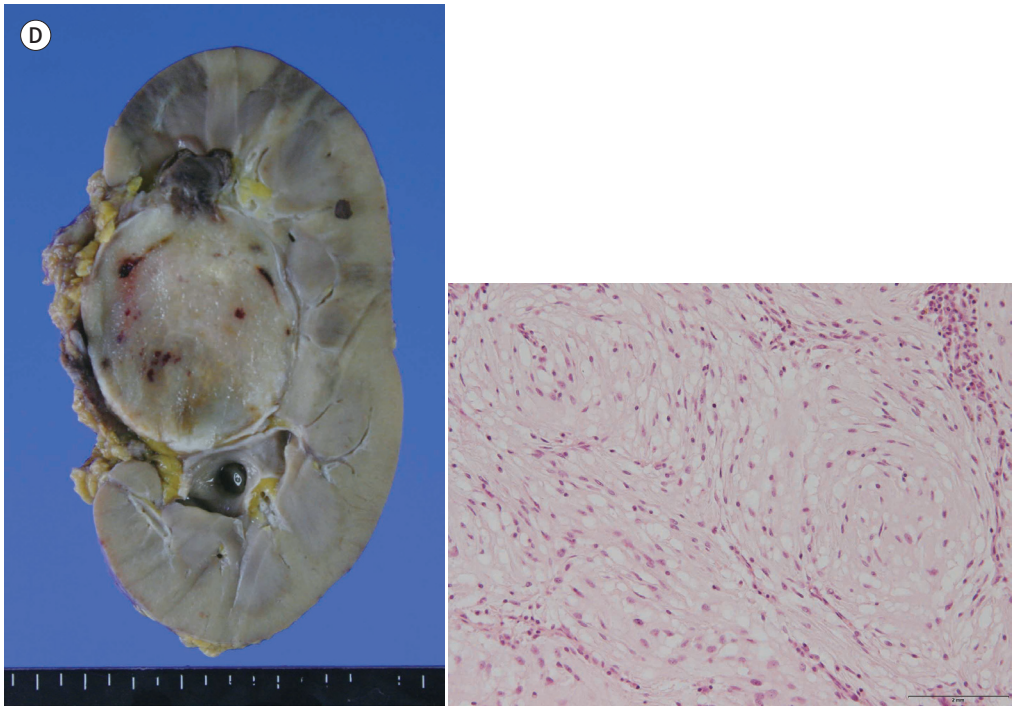


Fig. 1. Imaging and pathologic features of renal myxoma in a 62-year-old male.
D. Gross specimen obtained from left nephrectomy shows a well-demarcated, grayish-white, myxoid, soft mass in the renal pelvis, and microscopic specimen of the mass shows uniform bland-looking spindle cells in a diffuse whirling pattern (hematoxylin and eosin stain, × 200).



gery, but no local recurrence was observed at 6 years of follow-up.

This retrospective study was approved by the Institutional Review Board of our hospital, and the requirement for informed consent was waived (IRB No. GCIRB2018-268).

DISCUSSION

Renal myxoma was first reported by Hulke in 1887. Four more cases of renal myxoma were reported later. However, Melamed et al. (2) reported two cases of renal myxoma, while at the same time reclassifying some of the previously reported cases into other types of myxoid tumors (sarcomas with myxoid features, fibroepithelial polyps, and myxolipomas) apart from myxoma. Therefore, the official first-recorded renal myxoma was reported by Appel and Schoenberg in 1968 (3).

To date, 22 renal myxomas have been reported. Of these, 19 cases have been reported as English-language papers and 3 as Japanese-language papers (1-7). Including our case, there were no sex differences, with 11 cases reported in men and 8 in female. Sex was not mentioned in 1 case. The patient's age varied from 17 to 82 years, and the mean age was 50 years. Most of cases occurred in patients in their 50s and 60s. Most of the patients had no significant symptoms (n = 10). Cases were usually detected by accident on clinical examination for other diseases or during a health checkup. Patients presented with abdominal and flank pain (n = 7), gross hematuria (n = 2), or palpable mass (n = 1). Microscopic hematuria was noted in 2 cas-

es. The size of the tumor was also variable (1.8–28.0 cm). No trend could be defined as to the most common sites of tumor occurrence; it occurred at similar rates in several locations (right kidney, 10; left kidney, 9; transplanted kidney; 1, and upper, 5; mid [sinus], 7; lower, 7). All cases reported were surgically removed, and in most cases, nephrectomy was performed. However, most cases reported so far have been reported by pathologists or urologists, and only two cases have been reported by radiologists. Therefore, the radiologic findings associated with renal myxoma have been reported but not compiled. Hence, we have endeavored to summarize the reported radiologic findings of renal myxoma.

In old case reports, renal myxoma was shown as a mass pressing or displacing the renal calyx on excretory urogram or intravenous pyelography (n = 3). It has been reported as a well-defined hyperechoic mass on ultrasonography, and the echogenicity of the tumor is often heterogeneous (n = 6). The CT findings associated with renal myxoma were the most commonly reported of the imaging modalities (n = 14). Reports found that renal myxoma was shown on CT as a low attenuated mass with smooth margins on pre-contrast images, and it had mild homogenous or heterogeneous enhancement on contrast-enhancement studies (4, 5, 6). Perhaps this was due to intratumoral hemorrhage. In all the reported cases, CT was performed with a single contrast scan, so it is difficult to determine the enhancement pattern of the tumor. On the other hand, in our case, multiphase CT scans were performed, and the tumor showed gradual enhancement on the delayed phase. PET/CT was reported in one case involving a transplanted kidney, with no discrete hypermetabolic foci found (8).

The MRI finding of a renal myxoma was first reported by Owari et al. (4). To date, 5 cases have been reported, excluding our case (Table 1) (1, 4-7). In these reports, renal myxoma showed low signal intensity on T1WI and high signal intensity on T2WI. Nishimoto et al. (5) reported that renal myxoma showed homogenous enhancement during the dynamic phase. These findings are similar to those of our case. However, in these reports, other findings in an MRI sequence were not reported in detail, and some reports did not present MRI images in the literature.

All reported renal myxomas, including our case, were radiologically solid renal tumors that showed possible malignancy, and surgical resection was performed in order to exclude malignancy. However, if it were possible to radiologically predict a benign tumor, unnecessary surgery can be avoided. Clear cell RCC (ccRCC) and myxoma usually reveal high signal intensity on T2WI. ccRCC shows early enhancement and washout in the delayed phase, while myxoma reveals gradual enhancement (9). In contrast, pRCC shows gradual dynamic enhancement that is similar to that of myxoma, but has a low signal intensity on T2WI, which

Table 1. MRI Findings of Renal Myxoma in Five Reported Cases

Reference	T1WI	T2WI	Enhancement	DWI/ADC
Owari et al. (4)	Homogenous low SI	Heterogenous high SI	N/A	N/A
Bolat et al. (1)	Homogenous low SI	Heterogenous high SI	N/A	N/A
Noshimoto et al. (5)	Low intensity	High intensity	Homogenous	N/A
Gomez-Gonzalez et al. (7)	N/A	Hyperintense	Low intense	N/A
Thakker et al. (6)	Hypointense	Hyperintense	Enhanced	No restriction

ADC = apparent diffusion coefficient, DWI = diffusion-weighted imaging, N/A = not applicable, SI = signal intensity, T1WI = T1-weighted image, T2WI = T2-weighted image

can be useful to differentiate pRCC from myxoma. Chromophobe RCC (chRCC) may show well-circumscribed, T2 intermediated signal intensity mass with intermediated enhancement, similar to renal myxoma of our case. Usually, chRCC show relatively lower apparent diffusion coefficient (ADC) value rather than that of ccRCC. But, in our case, myxoma shows higher ADC value, in other words, no restriction on diffusion weight images. And there is no specific MRI finding of chRCC, such as central stellate scar or segmental enhancement inversion, in our myxoma case.

Thakker et al. (6) reported that malignant tumors depict diffusion restriction, whereas myxomas do not. This was true for our case. These MRI techniques, including dynamic contrast enhancement and diffusion-weighted imaging, are used to distinguish between RCC and myxoma, and awareness of MRI findings that are typical for myxoma might help to reduce unnecessary surgery.

Renal myxoma is a rare benign tumor, and MRI findings associated with renal myxoma are also rarely reported on. Knowing these MRI findings may help prevent the misdiagnosis of a benign myxoma as a malignant tumor.

Author Contributions

Conceptualization, S.Y.S.; data curation, Y.S.H., S.Y.S., P.S.H., C.S.J.; formal analysis, S.Y.S., P.S.H., C.S.J.; investigation, all authors; project administration, S.Y.S.; resources, C.D.H., Y.S.J.; supervision, S.Y.S.; validation, Y.S.H., S.Y.S.; visualization, S.Y.S., C.S.J.; writing—original draft, Y.S.H.; and writing—review & editing, S.Y.S.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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신장 점액종의 MRI 소견: 증례 보고와 문헌고찰

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신장 점액종은 신장에서 발생하는 드문 양성 종양이다. 최근까지 영미권에서 적은 수의 증례 보고가 되어 있으나 대부분의 경우 비뇨의학적 혹은 병리학적으로 접근하여 점액종의 영상의학적 소견은 잘 분석되지 않았다. 우리는 62세 남자 환자에서 발생한 신장 점액종의 영상소견을 보고하고자 한다. 해당 종양은 좌측 신장동에 위치하고 있었으며, 자기공명영상의 T2 강조영상에서는 중등도의 고신호강도로 T1 강조영상에서는 저신호강도로 보였다. 또한 종양은 역동적 조영증강 영상에서는 점진적인 조영증강을 보였다.

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