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Case Report

Mixed epithelial and stromal tumor of the kidney with long-term imaging follow-up ☆

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ABSTRACT

Mixed epithelial and stromal tumor (MEST) of the kidney is a rare benign tumor with malignant potential, and is characterized by epithelial and stromal proliferation with a variety of cellularity and growth pattern. MEST of the kidney is often depicted as a well-defined, solid mass with a cystic component. However, due to the rarity of the disease, there are no reports of its progression in serial imaging examinations. This report presents the case of a 68-year-old woman with MEST who was followed for 13 years by computed tomography (CT). To the best of our knowledge, this is the first report of image findings of MEST of the kidney over a follow-up period longer than 10 years.

Introduction

Mixed epithelial and stromal tumor (MEST) of the kidney is a renal neoplasm first described by Michal and Syrucek in 1998 [1]. MEST contains epithelial components, consisting of cysts of various sizes lined with epithelium, as well as mesenchymal components, consisting of spindle-shaped cells [2]. MEST is more common in middle-aged perimenopausal women, and is suspected to be related to estrogen exposure. In image examinations such as computed tomography (CT), MEST of the kidney is often identified as a distinct solid tumor with cystic components, and is described as a Bosniak category III or IV mass mimicking renal-cell carcinoma and multicystic dysplastic kidney [3]. However, due to the rarity of the disease, no report has described changes in its imaging findings over time.

☆ Competing Interests: The authors declare that there are no financial or personal interests with other persons or organizations that might inappropriately influence (bias) in this case report.

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This report highlights a case of MEST of the kidney in which longitudinal changes in CT image findings were observed over a period of 13 years.

Case report

A 68-year-old woman was referred to our hospital from another hospital for treatment of left breast cancer. A tumor was incidentally detected in her right kidney on CT images performed as a pre-treatment examination in our hospital. She had a past history of surgery for right breast cancer 24 years previously, and had been receiving long-term treatment with tamoxifen through the referring hospital. There was no relevant family history.

Fig. 1 shows CT images of the right kidney. The tumor measured 44 × 37 mm with circumscribed lobular margins and was localized in the central part of the right kidney, where it protruded into the renal sinus and compressed the renal pelvis. The tumor was heterogeneous and contained solid components as well as cystic components with thickened walls. Small calcifications were seen in the solid part on precontrast CT images. On dynamic contrast-enhanced CT, the solid part enhanced progressively with time. On magnetic resonance imaging (MRI) (Fig. 2), the solid components exhibited low signal intensity on T2-weighted images. Multiple cystic structures were identified within the mass on MRI, with some of their contents showing low signal intensity and others showing high signal intensity on T1-weighted images. In comparison with the CT images (not presented) obtained at the previous hospital one year previously, the solid component of the right kidney tumor had enlarged slightly. Based on the results of these imaging findings, the differential diagnosis at that time included MEST, angiomyolipoma with epithelial cyst (AMLEC), epithelioid angiomyolipoma (epithelioid AML), and renal cell carcinoma (RCC). Since malignancy, including malignant transformation of MEST, could not be ruled out, laparoscopic radical right nephrectomy was scheduled.

The gross appearance of the tumor specimen was of a mass comprising cystic structures with whitish solid components protruding from the renal parenchyma into the renal

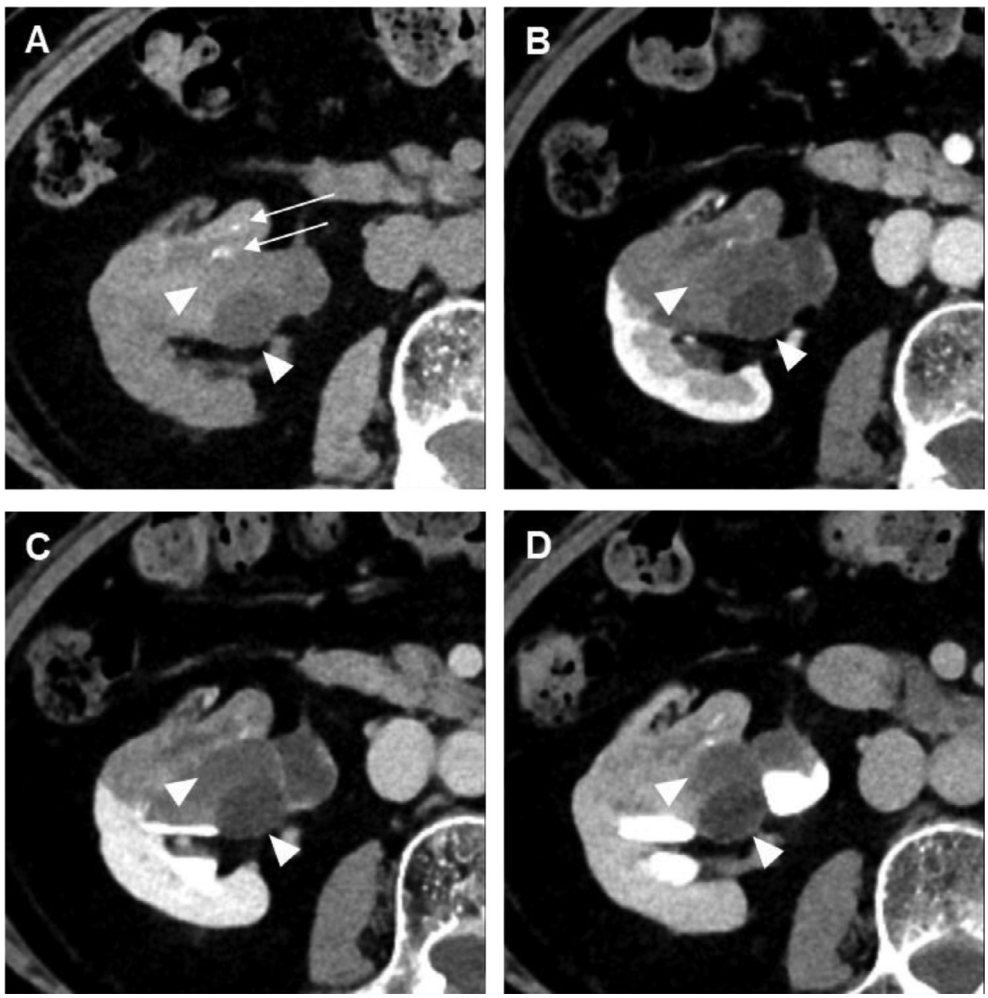

Fig. 1 – Dynamic contrast-enhanced CT images of the right kidney acquired at our hospital (A: precontrast, B: arterial phase, C: equilibrium phase, D: excretory phase). A lobulated mass in the right kidney protrudes into the renal sinus. The mass is heterogeneous and contains a solid component that shows gradual enhancement on dynamic CT. Several small calcifications are noted within the mass (arrows), in addition to some cystic components (arrowheads).

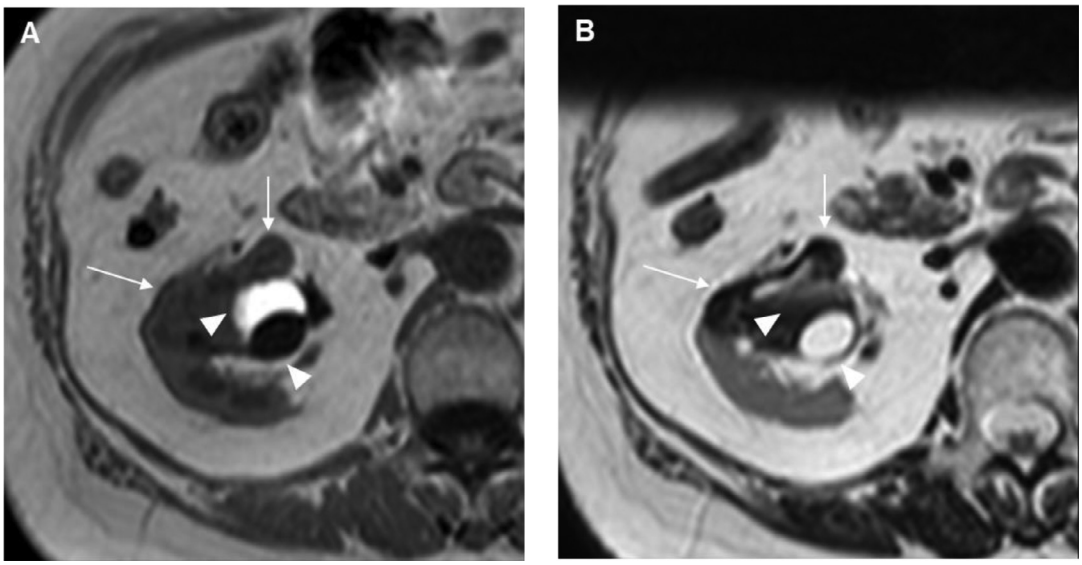

Fig. 2 – MRI of the right kidney (A: T1-weighted image, B: T2-weighted image). The solid component of the tumor shows isointensity relative to renal cortex on T1-weighted imaging and low signal intensity on T2-weighted imaging (arrows). The mass contains multiple cystic structures that contain both hypointense and hyperintense components (arrowheads).

sinus (Fig. 3). No bleeding was evident within the cystic components. No fistula was observed between the cystic components and the renal pelvis. Micrographs showed a cystic component lined by epithelial cells and an interstitial component composed of spindle-cells. No features of malignancy were observed. Based on these microscopic and macroscopic findings, the pathological diagnosis was MEST of the right kidney. The postoperative course was favorable, and the patient was discharged without any complications.

After the surgery, we discovered that the patient had previously undergone CT examinations at the referring hospital over a long period of time, which we reviewed. Fig. 4 shows CT images acquired in the time from 13 years ago to prior to the present surgery. In the images obtained 13 years ago, the tumor was approximately 7 cm in diameter and contained a complicated cyst with thick walls of about 3 mm, corresponding to Bosniak category IIF [4]. Subsequent CT scans showed an overall decrease in tumor size with time. Some cysts had become smaller or larger and the cystic wall had gradually thickened, with transformation into a mass with a predominantly solid component. Small calcifications were apparent within the mass on the CT obtained 6 years ago. During this period, the Bosniak category of the mass changed from IIF to III.

Discussion

This case report describes a patient with MEST in whom the course of the disease could be followed with CT images over a period of more than 13 years. To the best of our knowledge, no previous study has reported such long-term follow-up of MEST, which is a rare renal tumor entity, and the imaging findings over time are therefore invaluable.

MEST occurs mostly in middle-aged women around the time of menopause [3,5], many of whom have a history of long-term oral estrogen administration [7]. Thus, it is suspected that estrogen exposure is associated with the development of MEST. As the present patient had undergone treatment with tamoxifen for more than 10 years, it is likely that tamoxifen use was related to the development of MEST. A history of estrogen exposure over a long period of time may be key to the diagnosis of this disease.

Renal tumors of the same histological type as MEST had variously been termed leiomyomatous renal hamartoma, multilocular cyst with ovarian stroma, and cystic hamartoma of the renal pelvis. In the third edition of the WHO classification in 2004, these tumors were described as MEST, whereas in the fourth edition published in 2016, they were defined as the MEST family [6]. The MEST family is a group of diseases characterized by a cystic epithelial component and a stromal component containing spindle-shaped cells. It encompasses a spectrum of tumors ranging from adult cystic nephroma (in which the cystic component is predominant) to MEST (in which the stromal component is predominant). MEST is generally considered a benign tumor, but malignant transformation has been reported in a rare case [7]. As the present case showed a tendency for the solid component to increase in size and the lesion corresponded to Bosniak category III, surgery was performed because of the possibility of malignancy. Review of the serial CT images revealed that the cystic component was the predominant morphology more than 10 years ago. If surgery had been performed at that point, it is likely that the patient would have been diagnosed with adult cystic nephroma, which is now classified together with MEST in the MEST family. The cystic component tended to shrink gradually as the solid part slowly increased in size over a long period of time. Although it is unclear why this temporal change occurred, it may be associated with the morphological change

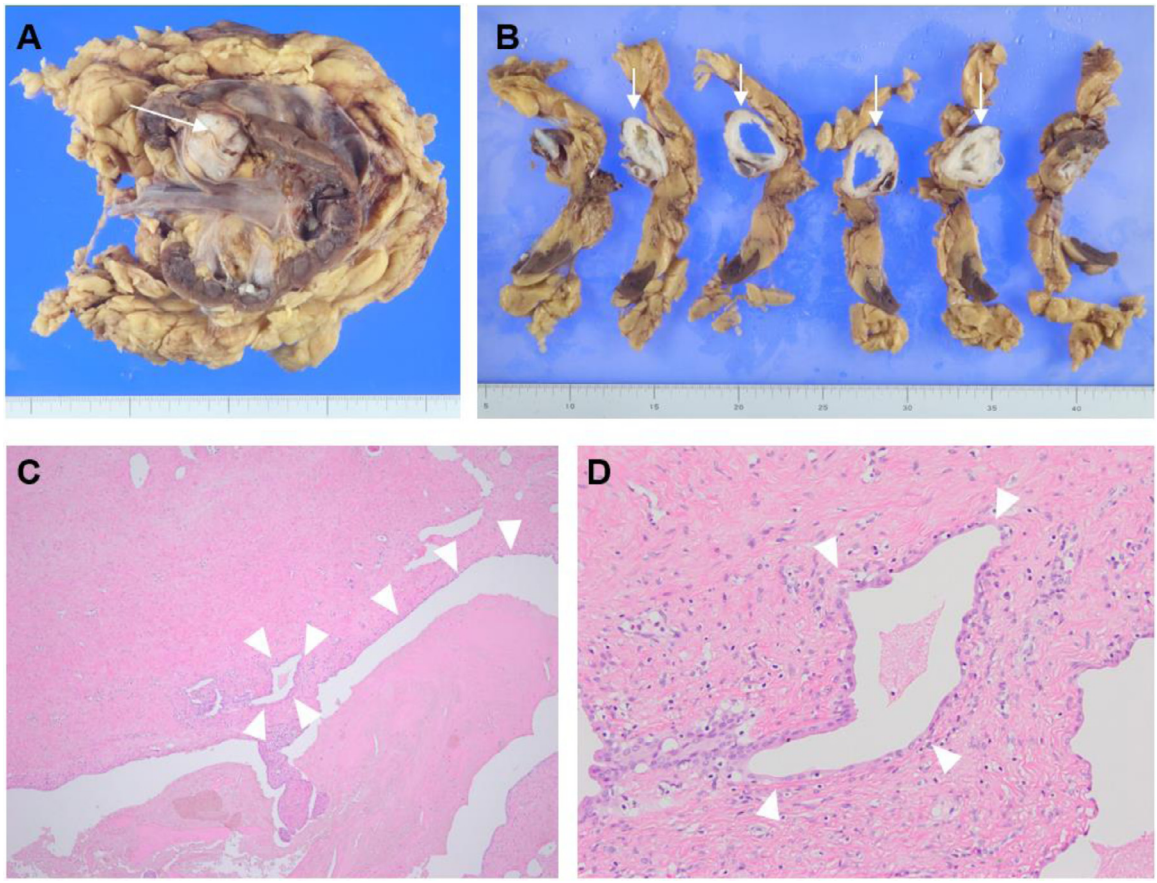

Fig. 3 – Photographs of cut sections of the gross specimen (A, B) and micrographs of hematoxylin-eosin staining. On gross examination, a well-defined, whitish solid mass containing a cystic component is observed in the right kidney (arrows). Microscopic images show abundant non-specific spindle cells and collagen-rich stromal components that are scattered with epithelium-lined cystic structures. No mitotic figures or atypical cells are observed in the epithelial components or interstitium (arrowheads).

that occurs in the MEST family due to long-term estrogen exposure.

MEST of the kidney is usually characterized as a well-defined solid mass with cystic components. Enhancement of the solid component of MEST is often relatively gradual on contrast-enhanced CT, as in the present case. An MRI feature of MEST is hypointensity of the solid component on T2-weighted images [8]. The findings of gradual contrast enhancement and hypointensity on T2-weighted images may be due to abundant fibrotic tissue in the solid component of MEST. It should be noted, however, that the solid component of MEST may be accompanied by degeneration such as edema or vitrification. In such cases, the entire solid component may not necessarily exhibit low signal on T2-weighted images. A previous study reported that 34% of MESTs contained microadipose tissue [9]. Hemorrhagic changes are rare in MEST. In the present case, some of the cystic components showed hyperintensity on T1-weighted imaging, but pathological examination revealed no fatty components or hemorrhage, suggesting a high protein concentration of the fluid content.

Diseases included in the differential diagnosis of MEST are AMLEC, epithelioid AML, and RCC. Similar to MEST, AMLEC is associated with a cystic component as well as a solid component that shows low signal on T2-weighted images, which makes it difficult to differentiate between the 2 entities based on the imaging findings. However, compared to AMLEC, MEST more often protrudes in the direction of the renal sinus as the tumor grows, which may be a useful differentiating feature. In addition, MEST is more common in women, whereas there is no gender difference in the occurrence of AMLEC. Similar to MEST, epithelioid AML also shows low signal on T2-weighted images; however, hemorrhage is very common in the solid and cystic components of epithelioid AML but much less frequently reported in MEST. The finding of bleeding may be useful in differentiating MEST from epithelial AML. It is important to consider cystic RCC in the differential diagnosis because most MESTs are classified as Bosniak category class III or IV [9]. Cystic change occurs in up to 15% of RCCs. The spectrum of cystic RCC includes multilocular cystic RCC, RCC arising from a preexisting benign cyst, and cystic degeneration of a previously solid RCC [10]. Compared to MEST, cystic RCC tends to

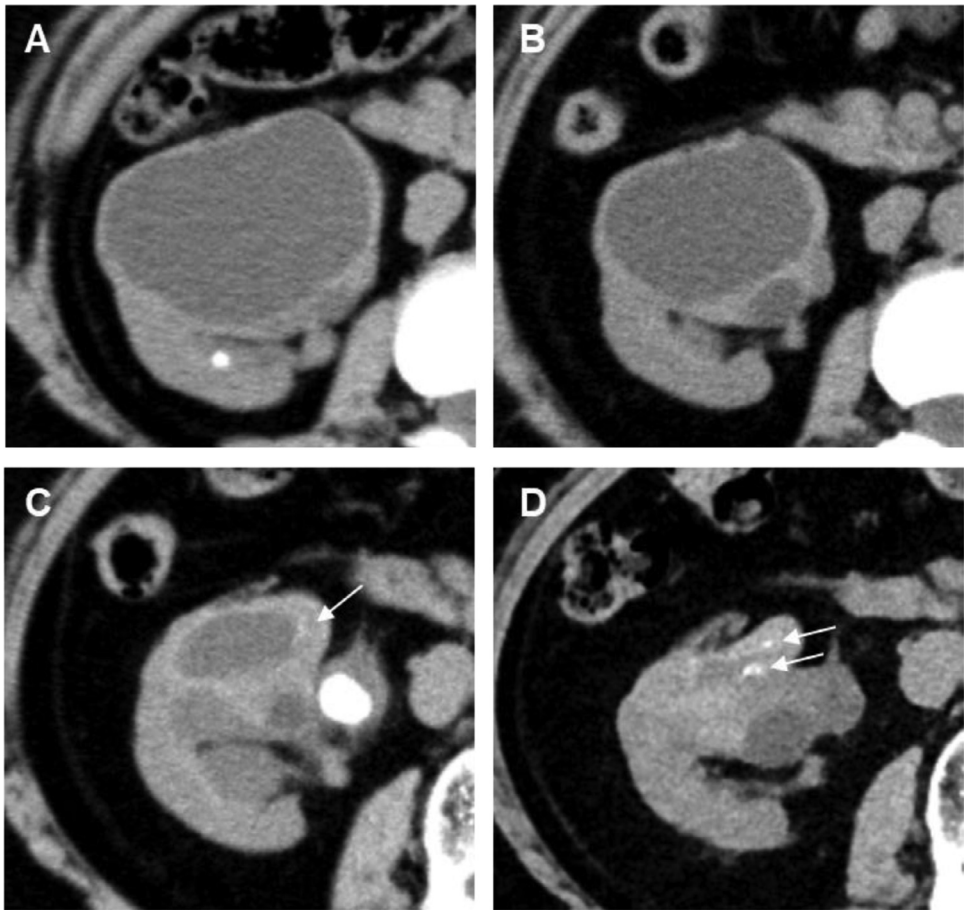

Fig. 4 – Long-term longitudinal changes of MEST of the right kidney. Serial noncontrasted CT images obtained 13 years ago (A), 10 years ago (B), 6 years ago (C), and just before the right nephrectomy (D). The tumor was approximately 7 cm in diameter 13 years ago, after which the overall size of the tumor gradually decreased. With time, the largest cystic structure showed gradual shrinkage and the cystic wall continued to thicken, changing into a lesion with predominantly solid components. Small calcifications (arrows) were apparent within the mass on CT obtained 6 years previously.

have thicker, irregularly enhancing septa and enhancing nodules or solid components [9].

In summary, we report a case of MEST in a 68-year-old woman in which temporal changes in the CT image findings could be followed over a period of more than 13 years. Such findings are rarely available and contribute to knowledge regarding the MEST family.

Patient consent

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

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