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Metanephric adenoma treated with laparoscopic nephrectomy: A case report

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Abstract. Metanephric adenoma is an uncommon benign renal tumor that occurs predominantly in adult females and rarely in children. Its histomorphology resembles that of epithelial Wilms' tumor and papillary renal cell carcinoma. From a diagnostic and therapeutic perspective, recognition of this entity is important as it has a more favorable clinical outcome compared with Wilms' tumor and renal cell carcinoma. Metanephric adenoma should not be treated with nephrectomy if the tumor size is small. However, preoperative diagnosis of this disease is extremely challenging. The present study describes a case of this rare disease, which was treated with laparoscopic nephrectomy. The tumor was not clearly enhanced in the early phase on contrast-enhanced computed tomography imaging. The immunohistochemical analysis revealed positive immunoreactivity for vimentin and Wilms' tumor 1, and partial positivity for cytokeratin (CK) AE1/AE3, CK56, and CK34, consistent with metanephric adenoma. Although metanephric adenoma is difficult to diagnose preoperatively, this rare disease must be considered in order to avoid unnecessary surgical procedures in these patients.

Introduction

Metanephric adenoma is a rare benign neoplasm of the kidney that occurs predominantly in middle-aged women, with few cases reported in childhood (1). Only 0.2% of adult renal epithelial neoplasms are diagnosed as metanephric adenoma (2).

Histogenetically, this lesion resembles epithelial Wilms' tumor; metanephros, which is formed from the ureteric bud and the metanephric blastema, is of mesodermal origin, and metanephric adenoma and Wilms' tumor are both derived from remnants of the metanephric blastema (1). Thus, from a clinical and diagnostic perspective, metanephric adenoma must be differentiated from Wilms' tumor, oncocytoma and papillary renal cell carcinoma (RCC).

The preoperative diagnosis of this benign tumor based on radiological findings is typically difficult; however, accurate diagnosis is of great importance as it may avoid unnecessary radical surgery (1). In the present study, in order to further the understanding of the characteristics of metanephric adenoma, a case is described along with its immunohistochemical and radiographic findings.

Case report

A 21-year-old woman with past history of thyroid tumor presented to the Department of Urology at Kanazawa University Hospital (Kanazawa, Japan) in May 2014 with a complaint of left lower back pain. There were no significant findings on physical examination. The results of the urinalysis, blood test and chest X-ray were normal.

Abdominal computed tomography (CT) and magnetic resonance imaging (MRI) revealed a large, round tumor occupying the upper and middle regions of the left kidney (Fig. 1A and B). The tumor was not clearly enhanced in the early contrast phase on CT imaging. There were no significant findings on bone scintigraphy. The preoperative diagnosis was papillary RCC, and a laparoscopic left nephrectomy was performed, with 294 min of the operation time and 50 ml of total bleeding.

Macroscopically, the tumor contained white and yellow regions, and measured 115x100x60 mm (Fig. 2A). On hematoxylin-eosin staining, the number of epithelial cells with scant acidophilic cytoplasm was increased compared with that of normal kidney tissue, and these epithelial cells formed the tubular structures (Fig. 2B). These histological features were not consistent with RCC. Immunohistochemical staining revealed positive immunoreactivity for vimentin and Wilms' tumor 1, whereas cytokeratin (CK) AE1/AE3, CK56, and CK34 were partially positive. CK7, CK20, epithelial membrane antigen, chromogranin A and synaptophysin were negative, and there were very few Ki-67 positive cells (0.2%; Fig. 3). These findings were consistent with metanephric adenoma.

A follow-up CT scan was performed 1 year after surgery, and revealed no local recurrence or metastasis.

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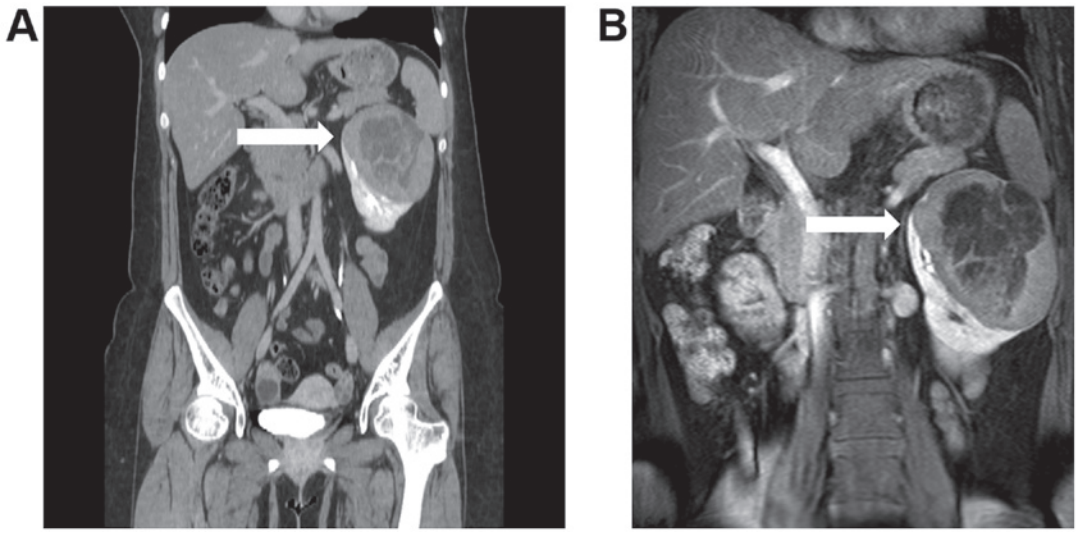

Figure 1. Radiological images revealed a large, round tumor (arrows) in the left kidney, with a low-density central area. (A) Contrast-enhanced computed tomography. (B) Contrast-enhanced magnetic resonance imaging.

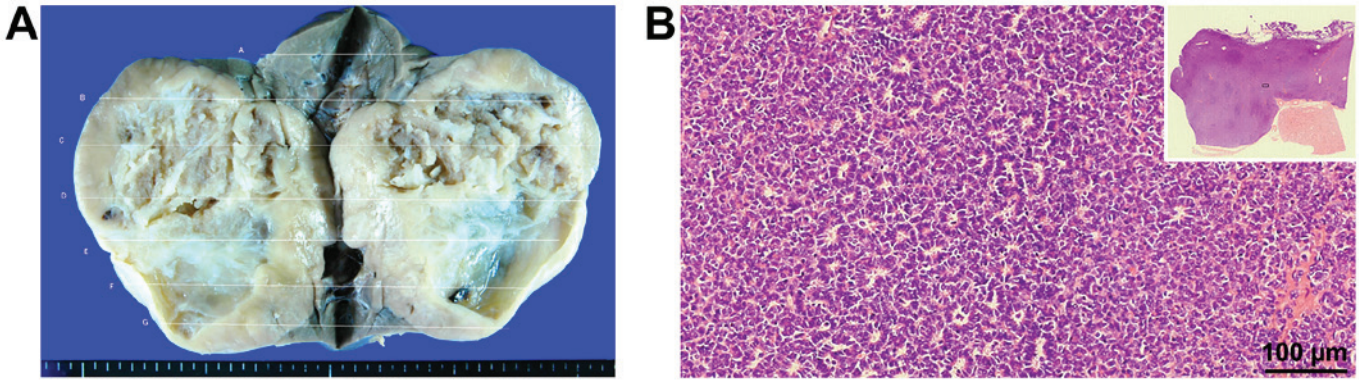

Figure 2. Histopathological examination. (A) Macroscopic view of the tumor. (B) Hematoxylin and eosin staining.

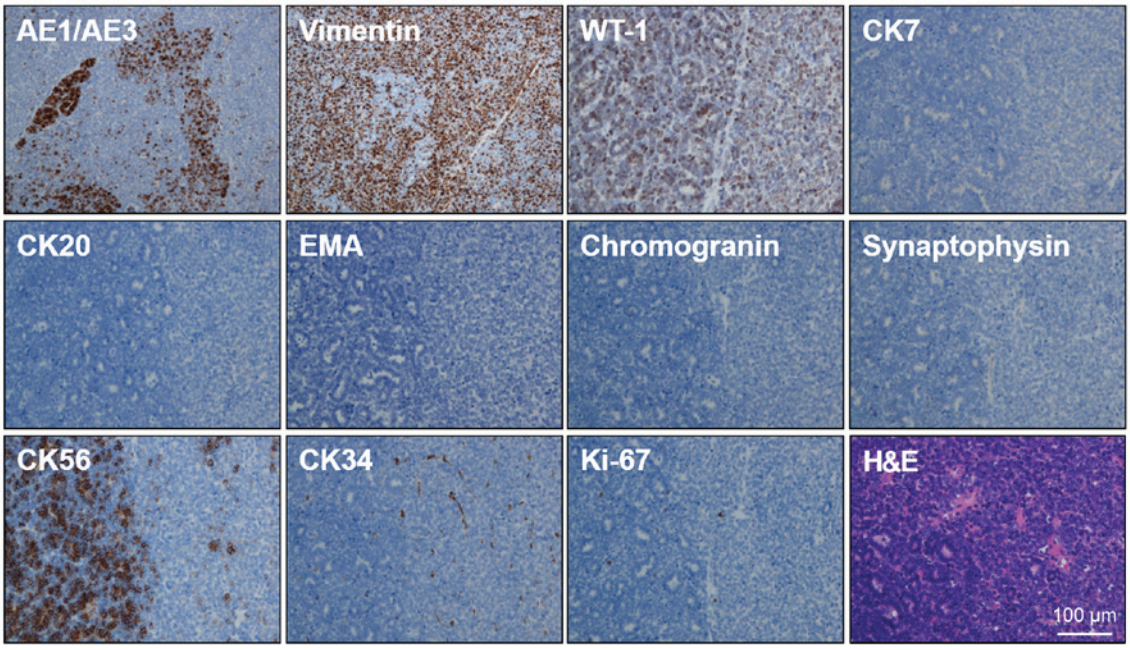

Figure 3. Immunohistochemical staining results. The tumor was positive for vimentin and WT-1, partially positive for CK AE1/AE3, CK56 and CK34, and negative for CK7, CK20, EMA, chromogranin and synaptophysin. The Ki-67 index was low. All images are shown at the same magnification level. Hematoxylin counterstaining was used. WT-1, Wilms' tumor 1; CK, cytokeratin; EMA, epithelial membrane antigen; H&E, hematoxylin-eosin.

Discussion

Metanephric adenoma is a rare neoplasm that accounts for 0.2% of adult renal epithelial neoplasms (2). Davis *et al* (3) reported the largest series of 50 cases of metanephric adenoma, which included patients ranging in age from 5 to 83 years (median, 44 years). There was a distinct female preponderance, with an approximate female:male ratio of 2:1. Almost 50% of the cases were asymptomatic and identified incidentally. The most common presenting symptoms were abdominal pain and hematuria. The mean tumor size was 5.5 cm, with a range of 0.3-15.0 cm (3).

From a clinical and diagnostic perspective, metanephric adenoma must be differentiated from Wilms' tumor, oncocytoma and papillary RCC. Radiologically, metanephric adenoma shows hypovascularity on contrast-enhanced CT; however, Wilms' tumor and papillary RCC exhibit similar features (3). On T2-weighted MRI, metanephric adenoma often exhibits low-intensity signals, which is also similar to the findings of papillary RCC. Thus, radiological examination is not sufficient to allow a diagnosis of metanephric adenoma, as demonstrated in the present case.

The difficulty of diagnosing metanephric adenoma prior to surgery is also due to the extremely low frequency of its occurrence (4). However, preoperative diagnosis is important to avoid excessive treatment, such as neoadjuvant therapy. Although two previous studies reported that needle biopsy could aid in diagnosing metanephric adenoma (4), nephrectomy was performed in the majority of previously reported cases as the entity could not be distinguished from a malignant tumor (5). In order to increase the rate of accurate diagnosis of metanephric adenoma, it should be considered in the differential diagnosis of renal masses, particularly in patients who are female and middle-aged, and have hypovascular tumors with clear borders.

The majority of metanephric adenomas are diagnosed following radical nephrectomy (5). However, radical nephrectomy may be unnecessary for patients with this disease as it is known to be a benign tumor. A previous study reported the case of an 11-year-old patient with a mixed tumor, which consisted of metanephric adenoma containing foci of Wilms' tumor or papillary RCC (6). In that case, metastasis was observed subsequent to surgery. In addition, a previous case report of pure metanephric adenoma in a child described the occurrence of lymph node metastasis subsequent to surgery (7). To the best of our knowledge, no previous study has reported the occurrence of metastasis in an adult patient with metanephric adenoma. However, the possibility of metastasis cannot be excluded, and surgical treatment may be required, particularly in cases involving large tumors, as large tumors have a greater probability than small tumors of containing mixed pathological tissues. In cases of small, hypovascular tumors occurring in middle-aged women, needle biopsy may be appropriate, and this may be also be necessary if the patient is unfit to undergo radical nephrectomy due to advanced age or renal dysfunction.

In summary, the present study reports a case of metanephric adenoma that was treated by laparoscopic nephrectomy. Although metanephric adenoma is difficult to diagnose preoperatively, this rare disease must be considered in order to avoid unnecessary surgical procedures in these patients.

References

1. Pasricha S, Gandhi JS, Gupta G, Mehta A and Beg S: Bilateral, multicenteric metanephric adenoma associated with Wilms' tumor in a child: A rare presentation with important diagnostic and therapeutic implications. Int J Urol 19: 1114-1117, 2012.
2. Hwang SS and Choi YJ: Metanephric adenoma of the kidney: Case report. Abdom Imaging 29: 309-311, 2004.
3. Davis CJ Jr, Barton JH, Sesterhenn IA and Mostofi FK: Metanephric adenoma. Clinicopathological study of fifty patients. Am J Surg Pathol 19: 1101-1114, 1995.
4. Terao H, Matsumoto T, Umemoto S, Onuki T, Kobayashi K, Ohgo Y, Nogcchi S, Kishi H, Tsuura Y and Nagashima Y: Metanephric adenoma: Report of two cases. Hinyokika Kiyo 54: 599-602, 2008.
5. Ebine T, Ohara R, Momma T, Saito S and Kuramochi S: Metanephric adenoma treated with laparoscopic nephrectomy. Int J Urol 11: 232-234, 2004.
6. Drut R, Drut RM and Ortolani C: Metastatic metanephric adenoma with foci of papillary carcinoma in a child: a combined histologic, immunohistochemical, and FISH study. Int J Surg Pathol 9: 241-247, 2001.
7. Renshaw AA, Freyer DR and Hammers YA: Metastatic metanephric adenoma in a child. Am J Surg Pathol 24: 570-574, 2000.