

Metanephric Adenoma of the Kidney in an Infant: A Case Report¹

Seung Ja Kim, M.D., Jung-Eun Cheon, M.D., Woo Sun Kim, M.D., Chong Jai Kim, M.D.²,
So Young Yoo, M.D., In-One Kim, M.D., Kyung Mo Yeon, M.D.

Metanephric adenoma is a rare tumor of the kidney that has been reported mostly in adults. Despite its rarity, metanephric adenoma should be included in any differential diagnosis of solid renal masses in children, especially because of its benign nature and benign clinical course allowing for nephron sparing surgery. We report a case of metanephric adenoma, presented as a solid renal mass in a 14-month-old boy, and discuss the histologic basis of the imaging features of this entity.

Index words : Kidney neoplasm, US
Kidney neoplasm, CT
Kidney neoplasm, in infants and children

Metanephric adenoma is a rare, benign neoplasm of the kidney composed of numerous metanephric tubules (1, 2). The histology of the lesion is well established, but the imaging findings have only been described in a few cases (3 - 6). Most reported cases of metanephric adenoma were with adults. To our knowledge, metanephric adenoma occurring in children is very rare (5 - 8). We describe ultrasonography (US), computed tomography (CT) and histologic findings of metanephric adenoma in a 14-month-old boy, and discuss the histologic basis of imaging feature of this entity and differential diagnosis of solid renal mass infancy.

Case Report

A 14-month-old boy presented to our clinic with an incidentally detected, palpable abdominal mass. He had no previous health problems and his family history

proved to be unremarkable. On physical examination, an adult fist-sized mass was palpable in the right sub-costal area. Laboratory tests including blood cell counts, serum electrolytes, and urine analysis showed no abnormal results.

US showed a 9 × 8 cm sized, well-demarcated, round hyperechoic mass in the right kidney (Fig. 1A). There was no cystic component or calcifications within the mass. On color Doppler US, curvilinear, blood flow was detected in the central portion of the mass (Fig. 1B). On precontrast CT scan, the lesion showed slightly higher attenuation than the adjacent normal renal parenchyma (Fig. 1C). On enhanced CT scan, the mass showed heterogeneous enhancement, and septa-like low attenuations were found in the central portion of the mass (Fig. 1D). There was no evidence of obstruction of the collecting system by the mass, renal vein thrombosis, lymph node enlargement, or ascites.

The preoperative diagnosis was Wilms' tumor. Although US-guided gun biopsy with a disposable 18-gauge needle was performed before surgery, the biopsy specimen was not adequate for a conclusive histologic diagnosis. As a result, the patient underwent right nephrectomy. The nephrectomy specimen showed a 9 × 9 × 7 cm, smooth, and well-encapsulated renal mass

¹Department of Radiology, Seoul National University College of Medicine, and the Institute of Radiation Medicine, SNUMRC

²Department of Pathology, Seoul National University College of Medicine
Received December 29, 2004 ; Accepted June 15, 2005

Address reprint requests to : Woo Sun Kim, M.D., Department of Radiology, Seoul National University Hospital, 28 Yongon-dong, Chongno-gu, Seoul 110-744, Korea.

Tel. 82-2-2072-3608 Fax. 82-2-747-5781

E-mail: kimws@radcom.snu.ac.kr

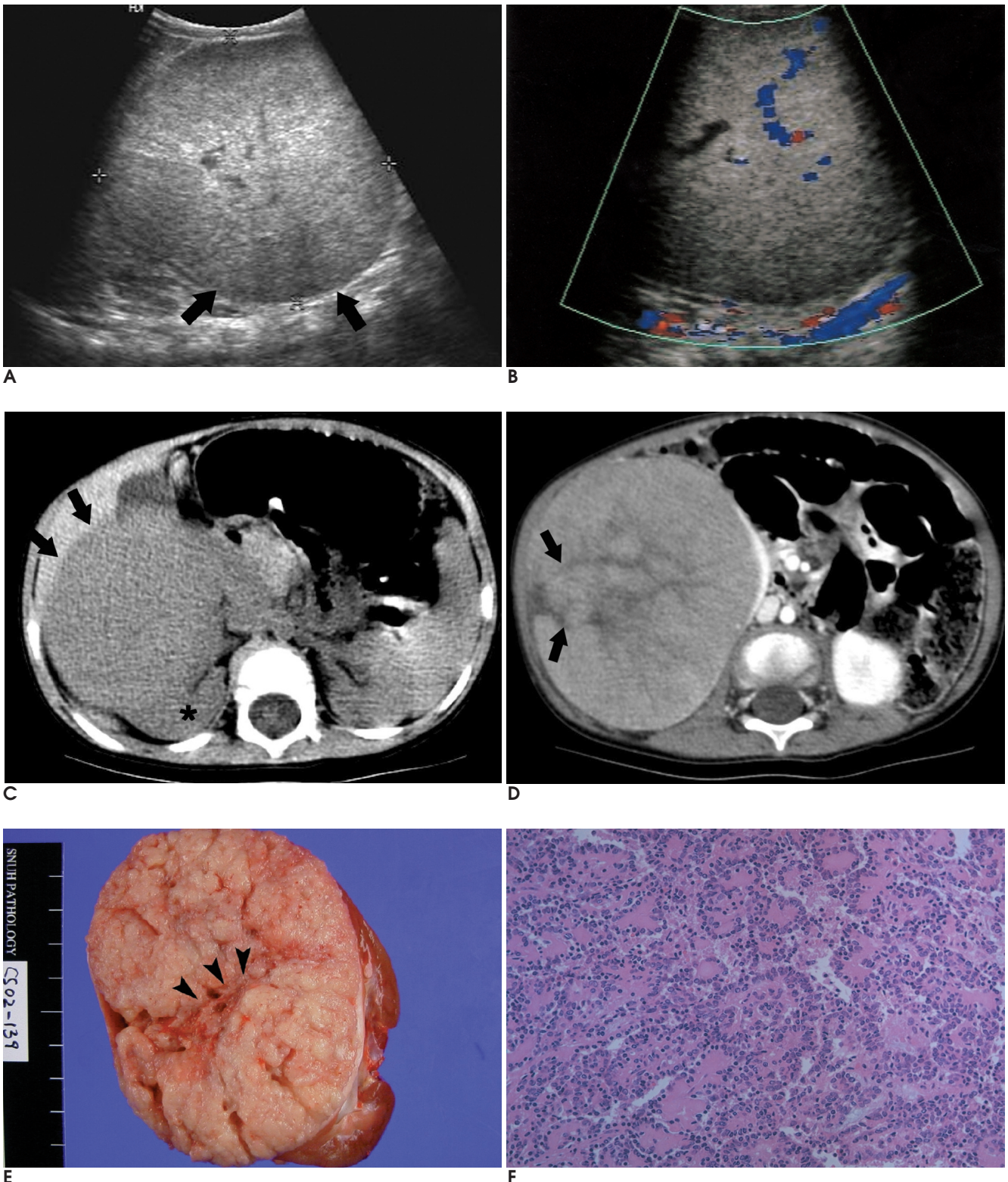


Fig. 1. A. Longitudinal US scan shows an 8.5 × 8 cm sized, well-demarcated, round hyperechoic mass (arrows) in the right kidney. B. Color Doppler US scan shows linear central vascularity within the mass. C. Precontrast CT shows a slightly hyperintense mass (arrows) compared with renal parenchyma (asterisk) in the right kidney. D. Contrast enhanced CT scan reveals a heterogeneously enhancing mass in the right kidney and the tumor shows lower attenuation than the enhanced normal renal parenchyma. The septa-like multiple low attenuations (arrows) are seen. E. The nephrectomy specimen. The mass shows a uniformly yellowish-white cut surface. Fibrous septa (arrowheads) are seen in corresponding portion with CT scan as Fig. 1D. F. On microscopy, the tumor is comprised of compact numerous tubular structures and demonstrates little mitotic activity.

with a yellowish, solid cut surface. The tumor on cut section showed band-like septa in the central portion of the mass (Fig. 1E). Microscopic examination showed monotonous, acinar and tubular structures lined by small, uniform epithelial cells with scanty cytoplasm and hyperchromatic round nuclei (Fig. 1F). There was neither mitotic activity nor psammomatous calcifications. The postoperative diagnosis proved to be metanephric adenoma.

There were no postoperative complications. Clinical and annual follow-up US during 2 years showed no recurrence or metastasis.

Discussion

According to the criteria of Mostofi (2), renal adenomas are classified as tubulo-papillary adenoma, metanephric adenoma, or oncocytoma. Metanephric adenoma, the most recently recognized type of these three entities, is typically a highly cellular tumor composed of tightly packed small, uniform and round acini. Psammomatous calcifications and thin and discontinuous pseudocapsules are commonly found (1, 7, 8). Different terms have been applied to this entity, such as renal epithelial tumor resembling an immature nephron, nephrogenic nephroma, or embryonal adenoma (1, 5, 6). In children, metanephric adenomas have been rarely reported. A literature review showed only eight cases of metanephric adenoma in children of whom the youngest patient was a one and half year-old boy (5 - 8). Metanephric adenoma generally exhibits benign behavior and is successfully treated with complete surgical resection.

The imaging findings of metanephric adenoma have been reported in a few cases (3 - 6). Metanephric adenoma shows hyperechogenicity on US and high attenuation on unenhanced CT scan owing to the presence of tubulopapillary structures and psammomatous calcifications (3, 5, 6). The isointense signal intensity of the metanephric adenoma on magnetic resonance imaging has been reported (4). In our case, the imaging findings were similar to those of previous reported US and CT appearances of metanephric adenoma. US examination revealed a hyperechoic mass with intratumoral blood flow. The mass showed a higher attenuation than the surrounding renal parenchyma on precontrast CT, which corresponded with histologic features suggesting compact cellularity composed of numerous tubules and acini. In this case, however, we did not find psammo-

matous calcifications at microscopic examination. Low attenuating septa-like structures on enhanced CT scans were corresponded with band-like fibrous septa in the central portion of the mass on histopathologic examination.

Although these imaging features have been considered as suggestive findings of metanephric adenoma (3 - 6), it remains not specific enough for a conclusive preoperative diagnosis of metanephric adenoma. The differential diagnosis of a solid renal mass found in patients younger than 2 years, should include malignant tumors, such as Wilms' tumor and rhabdoid tumor, and benign renal tumor such as mesoblastic nephroma. Wilms' tumors are the most common pediatric renal masses and 80% of the patients present before their 5th year (1). Wilms' tumor usually shows various echogenicity on US and heterogeneous attenuation on CT scans, which represents hemorrhage, fat, necrosis, or calcification (1, 9, 10). Rhabdoid tumor of the kidney is rare, but it is the most aggressive pediatric renal neoplasm (11, 12). The average age of the patients is 11 months, and the age range overlaps that of both mesoblastic nephroma and Wilms' tumor. Rhabdoid tumors lack the sharply circumscribed appearance and capsule formation that are typical for Wilms' tumor. Necrosis and hemorrhage, both of which are characteristically subcapsular in location, are present in the majority of cases (11). Mesoblastic nephroma is a benign tumor which affects infants, mostly neonate. It is characterized by a solid and unencapsulated mass that replaces most of the renal parenchyma. Although surgical resection is usually curative, local recurrence remains possible if tongues of tumor tissue are left behind at the surgical margin (12).

In children with a solid renal mass, the diagnosis is based on imaging features of the tumor, while biopsy is not recommended as it is thought to increase the risk of flank relapse, hence upstaging the tumor (13). The critics argue that this approach has the risk of suboptimal treatment of both benign and malignant tumors. Numerous studies have revealed that despite advances in imaging technology, 5 - 10% of the cases which are clinically and radiologically diagnosed as Wilms' tumors proved to be other tumors or benign lesions on histologic examination, as in our case. Although percutaneous needle biopsy carries a risk of increased morbidity varying from non-specific local pain to intratumoral bleeding or tumor seeding in the biopsy tract, and it may lead to an inconclusive diagnosis, needle biopsy is helpful for

establishing an appropriate course of therapy (13).

In conclusion, despite its rarity, metanephric adenoma should be considered in the differential diagnosis of solid renal masses in children when on US a well-defined margin, hyperechogenicity mass is seen and on post-contrast CT scans septa-like low attenuations within the mass is seen. Preoperative suggestion of benign metanephric adenoma may be useful for the determination of therapy and thus could lead to local resection or heminephrectomy with sparing of normal ipsilateral renal tissue.

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