

# Multiphasic contrast-enhanced CT and MRI findings of adult mesoblastic nephroma: A report of two cases

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## Abstract

Mesoblastic nephroma (MN) presenting in an adult is extremely rare. The computed tomography (CT) and magnetic resonance imaging (MRI) features of this tumor in adulthood have not been widely reported. We present two additional cases of adult MN and describe the multiphasic contrast-enhanced CT and MRI findings.

**Key words:** Adult; computed tomography; magnetic resonance imaging; mesoblastic nephroma

## Introduction

Congenital mesoblastic nephroma (CMN) is a rare tumor of infancy, which is usually diagnosed in the first 3 months of life.<sup>[1]</sup> It is a special type of nephroblastoma that rarely occurs in adults. The first case of adult mesoblastic nephroma (MN) was described by Block in 1973.<sup>[2]</sup> Although the findings of the computed tomography (CT) and magnetic resonance imaging (MRI) for MN in adults have been described in sporadic cases,<sup>[3]</sup> the multiphasic contrast-enhanced CT and MRI features have not been widely reported. We present two additional cases of MN and describe their features on multiphasic contrast-enhanced CT and MRI.

## Case Reports

### Case 1

A 47-year-old woman presented with an incidentally detected renal mass on a routine physical exam. The

results of the laboratory examination were unremarkable. Ultrasound examination of the kidneys detected a 5.5-cm, well-delineated, partly cystic mass located in the middle polar of the left kidney (not shown). T2-weighted imaging (T2WI) demonstrated a heterogeneous predominantly hypointense mass with interspersed stellate-like hyperintensity [Figure 1A]. Mass was isointense relative to renal parenchyma on T1-WI with areas of low signal intensity [Figure 1B]. The lesion presented mild patchy enhancement on the corticomedullary phase (CMP) [Figure 1C] and progressive heterogeneous enhancement on the nephrographic phase (NP) and pyelographic phase (PP) [Figure 1D and E, respectively]. Multiphasic images consisting of CMP (20-30 sec), NP (80 sec) and PP (120 sec) phases were acquired after the administration of contrast material. There was no suggestion of lymphadenopathy or renal vein involvement on any of the sequences. The patient was diagnosed as renal cell carcinoma and underwent radical left nephrectomy. The pathologic diagnosis was an MN [Figure 1F]. The patient was free of disease on the 1-year follow-up examination.

### Case 2

A 46-year-old man with a history of intermittent gross hematuria for 1 year was admitted to our hospital. Ultrasound examination of the kidneys detected a 12-cm, well-delineated, partly cystic mass herniating into the right renal pelvis (not shown). A CT scan revealed a well-defined, solid and

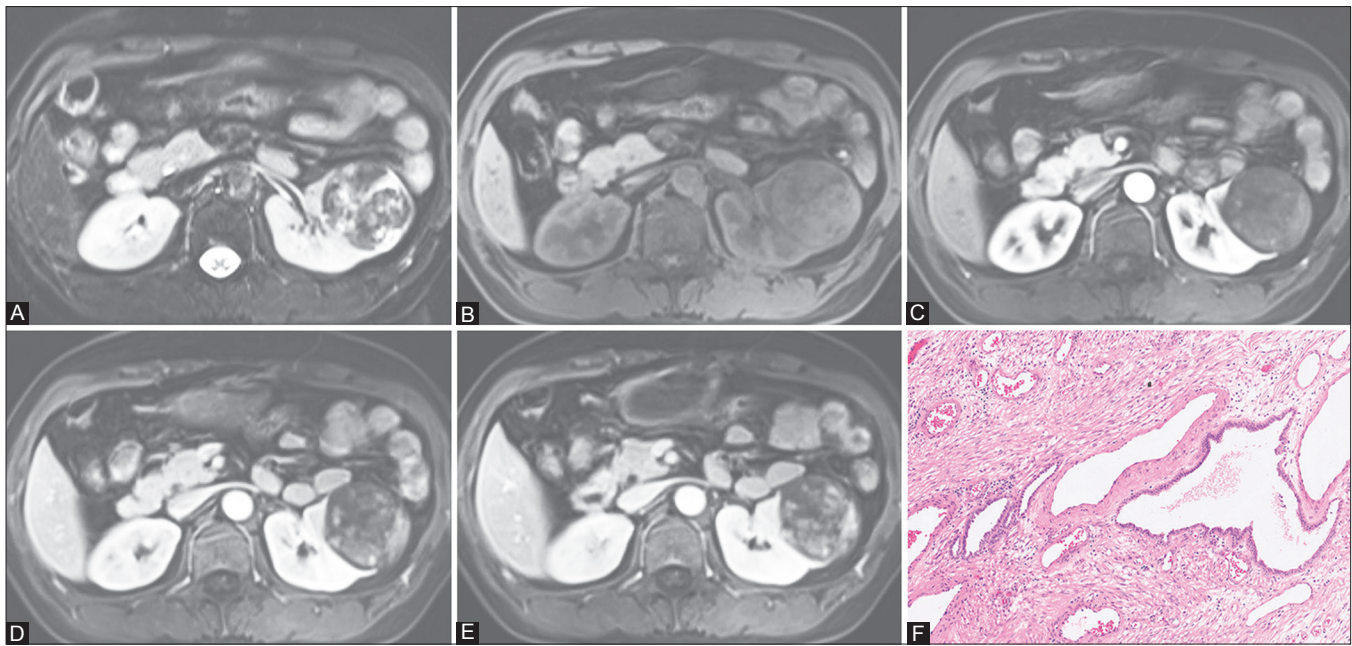
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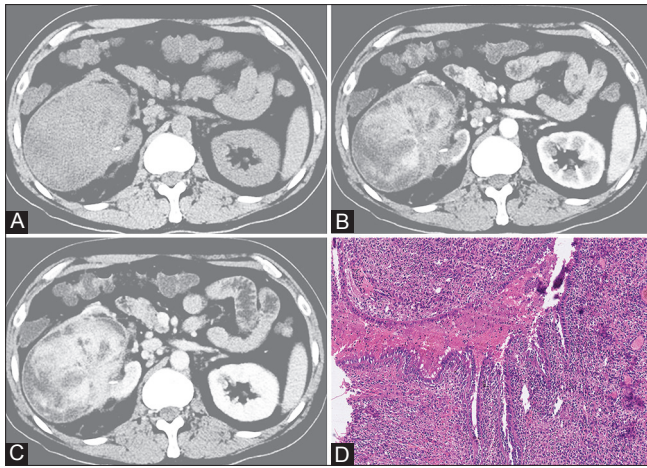
**Figure 1 (A-F):** Adult mesoblastic nephroma in a 47-year-old woman. Magnetic resonance imaging showed a complex but predominantly solid heterogeneous left renal mass. (A) T2WI demonstrated a heterogeneous predominantly hypointense mass with interspersed stellate-like hyperintensity, measuring 5.5 cm in diameter. (B) The mass showed isointensity with intratumoral hypointensity stripes on T1WI. Corticomedullary phase (C), nephrographic phase (D), and pyelographic phase arterial phase (E) multiphase contrast-enhanced MRI scans demonstrated the progressive enhancement feature of the tumor. (F) Photomicrograph (original magnification,  $\times 100$ ; hematoxylin–eosin stain) showed complex tumors composed of large cysts, microcysts, tubules, and spindle cells

cystic, mixed attenuation renal mass bulging into the renal pelvis [Figure 2A]. The mass was ovoid and mainly solid, showing heterogeneous attenuation with moderate prolonged enhancement on CMP and NP [Figure 2B and 2C, respectively]. The highest CT value of the tumor was 46 HU, 120HU and 135HU on plain scan, CMP and NP, respectively. There was no enhancement seen in the hypoattenuation area of the mass corresponding to the cystic area described on ultrasound. The tumor was bulging out of the renal parenchyma without peri-nephric infiltration. A radical nephrectomy of the right kidney was performed because of the diagnosis of renal cell carcinoma on CT scan. Microscopically, the tumor was composed of spindle-shaped cells showing both fibroblastic and muscle differentiation admixed with entrapped clusters of tubular epithelium. The epithelial component showed large foci of proliferating tubules. There was no cytologic atypia in either the mesenchymal or the epithelial component. On histological examination, the tumor was composed mainly of proliferating spindle cells, which stained strongly with smooth muscle actin, with variable cellularity and epithelial tubular cells scattered amid the spindle cells [Figure 2D]. Although the tumor was well circumscribed, it lacked a true capsule. The patient was free of disease on the 2-year follow-up examination.

## Discussion

CMN is most commonly seen in infants of age less than 2-3 months, which was first described by Bolande *et al.*<sup>[4]</sup> in 1967. The term is used to replace other terms such as fibroma,

fetal mesenchymal hamartoma, and leiomyoma. Adult MN has been reported in the literature with sporadic cases since 1973.<sup>[2]</sup> In 2000, Adsay *et al.*<sup>[5]</sup> published a series of tumors and named them mixed epithelial and stromal tumor (MEST). and they contended that this entity encompassed previously described cases of adult mesoblastic nephroma, cystic nephroma (CN), cystic hamartoma of the renal pelvis, adult mature nephroblastoma, and benign MEST of the kidney.<sup>[5,6]</sup> MN is predominantly a mixed tumor of both mesenchymal and epithelial cell origins and is histologically classified as classic and cellular (atypical) variants. There are remarkable similarity between CN and MEST in morphologic attributes of both the epithelial and stromal components and immunohistochemical profile albeit with variation in individual categories with higher prevalence of stromal to epithelial ratio, prominent ovarian stroma, smaller cysts with phyllodes glands pattern and stromal luteinization being more common in MEST; and large cysts, thin septae and low stromal to epithelial ratio in CN.<sup>[7]</sup> Macroscopically, adult MNs often arise centrally in the kidney and grow as expansile and well- circumscribed masses, less likely herniating into the renal pelvic cavity.<sup>[6]</sup> Microscopically, adult MNs are complex tumors composed of large cysts, microcysts, and tubules. The largest cysts are lined by columnar and cuboidal epithelium which sometimes form small papillary tufts.<sup>[8]</sup> The collecting duct differentiation expressed by most tubules and cysts of adult MN implies the ureteric bud as an important element in the histogenesis of this rare type of renal tumor. Moslemi *et al.*<sup>[9]</sup> searched MEDLINE and collected reported cases of MEST since 1997.



**Figure 2 (A-D):** MEST in a 46-year-old man with a history of intermittent gross hematuria. Axial CT scan (A-C) showed a complex but predominantly solid right renal mass, herniating into the renal pelvis. The well-defined mass demonstrated marked delayed contrast enhancement. (D) Photomicrograph (original magnification,  $\times 100$ ; hematoxylin–eosin stain) showed that the tumor was composed mainly of proliferating spindle cells, with dilating epithelial tubular cells scattered amidst the spindle cells

Of 90 patients with MEST, 7 subjects were men and 83 were women, with the mean age of 56 years (range 17–84 years), especially in perimenopausal women or patients who have received female hormonal treatment. Patients can be asymptomatic. The most common presenting symptoms are flank mass (31.8%) and gross hematuria (27.3%). The diameter of the tumor is comparatively large, and most of them are more than 5 cm (mean, 12.3 cm).

There is little documentation of the imaging appearances of adult MN. Shiraishi *et al.*<sup>[10]</sup> gave a brief review of CT features in 12 cases. The tumor tends to appear as a solid homogeneous tumor and enhances heterogeneously after injection of intravenous contrast medium. The radiological appearance described by Anik Sahni *et al.*<sup>[11]</sup> is partly concordant with our cases. The lesions are well-circumscribed cystic lesions with solid enhancing components. Neither lesion has lymphadenopathy or extrarenal involvement. The tumor appears as heterogeneous low- to isointense lesions on T1WI and high-intensity lesions on T2WI. Nevertheless, there were mainly solid lesions with interspersed stellate-like fluid elements in our case. As a result, the tumor appeared as a heterogeneous predominantly hypointense mass with interspersed stellate-like hyperintensity on T2WI, suggesting that the tumor consisted of fluid elements of various degrees.

Preoperative radiologic diagnosis of adult MN is problematic, as 70% of these tumors are Bosniak category IV or solid lesions.<sup>[11]</sup> Renal cell carcinoma (RCC) is an important consideration in the differential diagnosis in the two cases of our study. Cystic change occurs in up to 15% of RCCs. Compared with MEST, cystic RCC tends to have thicker, irregularly enhancing septa and enhancing nodular or solid components.

The adult MN or MEST of the kidney is classified as benign tumor, and has been treated successfully by radical or partial nephrectomy or by tumorectomy. However, local recurrence and metastasis can occur particularly with the cellular variant of the tumor. As a result, regular postoperative follow-up is required.<sup>[12,13]</sup>

## Conclusion

when we encounter a well-defined solid and cystic renal mass with progressive contrast enhancement, especially in perimenopausal women or patients who have received female hormonal treatment, the possibility of MN should be considered.

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