
CASE REPORT

Imaging Appearance of Renal Epithelioid Angiomyolipoma: a Rare Variant of Renal Angiomyolipoma with Diverse Clinical Behaviours

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ABSTRACT

Renal epithelioid angiomyolipoma is a rare variant of renal angiomyolipoma. The condition occurs in patients with or without tuberous sclerosis. Clinical behaviour of renal epithelioid angiomyolipoma varies widely, ranging from benign to malignant. Only a few reports have described its radiological features. We report two cases of renal epithelioid angiomyolipoma in patients without tuberous sclerosis. The first patient had no recurrence after nephrectomy, while the other patient had metastasis at presentation and initially responded to temsirolimus but later showed disease progression.

Key Words: Angiomyolipoma; Carcinoma, renal cell; Tuberous sclerosis

中文摘要

腎上皮樣血管平滑肌脂肪瘤的影像學表現：腎血管平滑肌脂肪瘤罕見變種呈現廣泛臨床特徵的影像學表現

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腎上皮樣血管平滑肌脂肪瘤是腎血管平滑肌脂肪瘤的罕見變種。不論患者是否有結節性硬化症都可以有腎上皮樣血管平滑肌脂肪瘤。此症從良性到惡性的臨床表現可以有很大差異，迄今描述其影像學特徵的文獻較少。本文報告腎上皮樣血管平滑肌脂肪瘤的兩名患者，均無結節性硬化。其中一名患者接受腎切除後無復發。另一名患者病發時出現轉移，初期對西羅莫司有反應，但後來病況加劇。

INTRODUCTION

Angiomyolipoma (AML) is the most common mesenchymal renal neoplasm.¹ The prevalence of AML in a healthy adult population without tuberous sclerosis complex (TSC) is 0.13%,² whereas 50% of patients with TSC have AML, which tends to be multiple and bilateral.³

Renal AML consists of two distinct histological subtypes: classic triphasic and monotypic epithelioid AML.¹ Classic AML is common, benign, and is composed of varying amounts of dysmorphic blood vessels, smooth muscle cells, and adipose tissue.⁴ Epithelioid AML, first described in 1998 by Pea et al,⁵ is rare, and composed purely of epithelioid cells

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arranged in sheets and characterised by the absence of both adipocytes and abnormal vessels.

In 2011, Nese et al⁶ estimated that 120 cases of epithelioid AMLs had been reported in the literature. There are only a few reports describing the imaging appearance of renal epithelioid AMLs.^{1,4,7-10}

Here, we report two cases of histologically proven renal epithelioid AML in patients without TSC. The report describes the imaging appearance of epithelioid AMLs and their clinical behaviours.

CASE REPORTS

Case 1

In December 2009, a 53-year-old woman had elective

ultrasonography (USG) of the abdomen for non-specific epigastric pain. The USG showed an incidental finding of a 5-cm roundish homogeneous hypoechoic lesion at the upper pole of the left kidney (Figure 1a). The patient was otherwise well, without systemic presentation such as weight loss or loss of appetite. Her renal function test results were also within normal limits. The patient had a history of hypertension and hypercholesterolaemia. There were no clinical stigmata of TSC.

Computed tomography (CT) urogram was performed to further characterise the lesion. The scan showed a 7-cm exophytic mass lesion protruding from the upper pole of the left kidney (Figures 1b to d). The mass had both cystic and enhancing solid components. The solid component was hyperdense in pre-contrast study. In

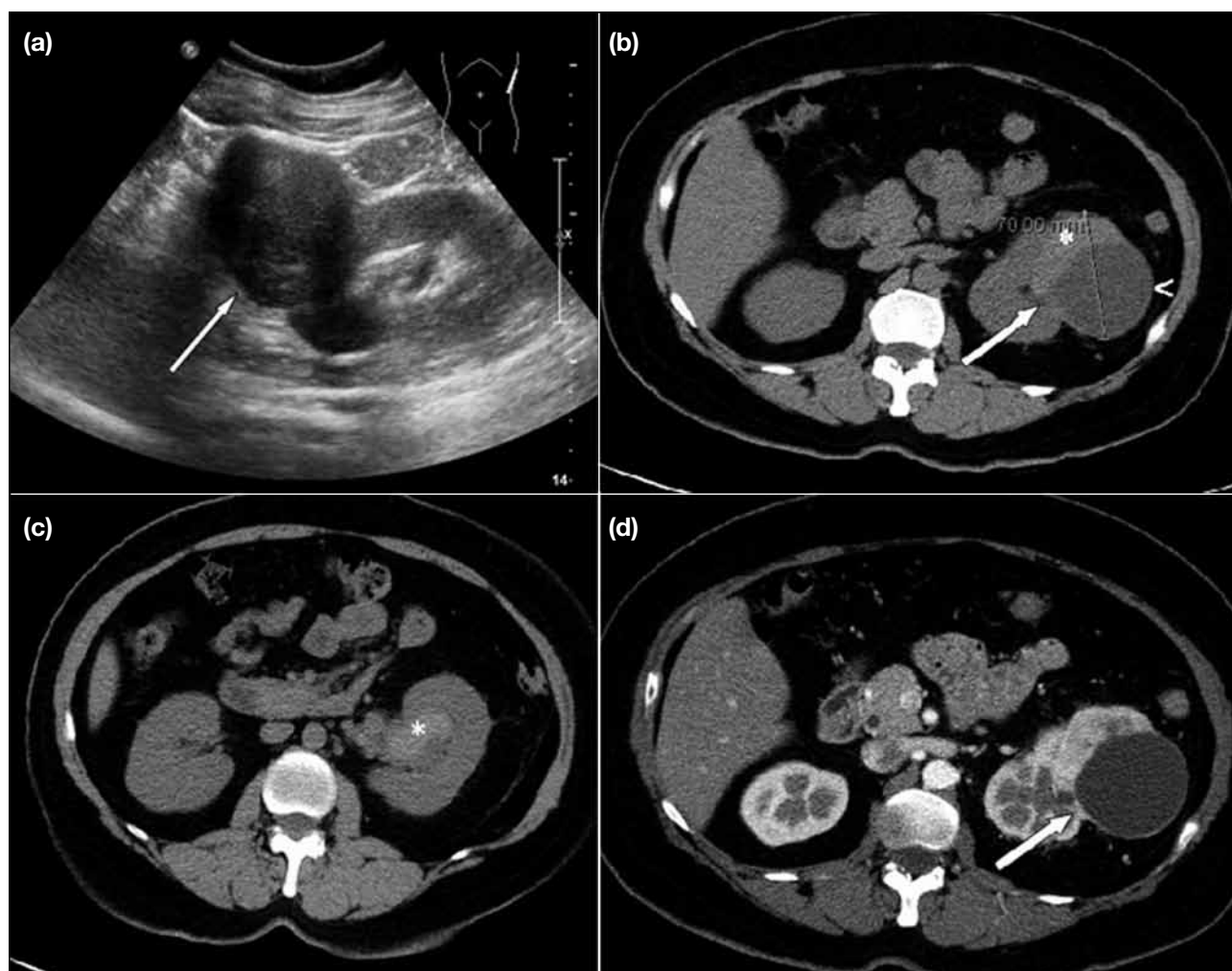


Figure 1. Images of a patient with renal epithelioid angiomyolipoma (case 1). (a) Ultrasonography shows a roundish homogeneous hypoechoic lesion at the upper pole of the left kidney (arrow); (b) plain computed tomography (CT) of the abdomen shows a hyperdense exophytic mixed solid (asterisk) and cystic mass (arrowhead) of 7 cm in the upper pole of the left kidney (arrow); (c) plain CT of the abdomen demonstrates hyperdensity within the central sinus fat, suggestive of haematoma (asterisk); and (d) contrast-enhanced CT of the abdomen shows heterogeneous enhancement of the solid component (arrow). No fat density or calcifications are noted within the tumour mass.

addition, non-contrast study showed hyperdensities within the central sinus fat suggestive of haematoma in the renal pelvic sinus. There was no fat density or calcification within the tumour mass. The left renal vein was patent. The provisional diagnosis was renal cell carcinoma.

The patient underwent left total nephrectomy. The pathological diagnosis of the left upper pole renal mass was epithelioid AML. There has no vascular or ureteric invasion. The patient had regular surveillance imaging and no recurrence or metastasis was seen in the CT scans performed 1 year and 3 years after the surgery.

Case 2

In February 2012, a 51-year-old man presented to Tuen Mun Hospital with a left upper quadrant mass of about 7 months' duration that was increasing in size. The patient also had weight loss of approximately 10 pounds in the previous few months. He had a history of hypertension, hyperlipidaemia, and ischaemic heart disease. He had no clinical stigmata of TSC. There was no haematuria or loin pain. Renal function test results were within normal limits.

Before presentation to Tuen Mun Hospital, the patient had CT scan of the abdomen performed in a private facility, which demonstrated a large left renal mass. According to the CT scan, there were also multiple

hepatic masses. The provisional diagnosis was renal cell carcinoma with liver metastasis. Embolisation of the left tumour mass had been done in a private hospital. Biopsies of the left renal mass and hepatic mass were performed and histological analysis of the specimens showed that the overall features were suggestive of epithelioid AML with marked cellular atypia.

CT scan of the abdomen done at Tuen Mun Hospital showed a large heterogeneously enhancing mass in the left kidney (Figure 2). The mass had mixed solid and necrotic components. The solid component was hyperdense in pre-contrast study. Multiple metallic densities were seen in the superior part of the lesion, likely related to previous embolisation. No fat density or calcification was noted within the tumour mass. The left renal artery and left renal vein were patent. Multiple heterogeneously enhancing lesions were observed in both lobes of the liver, in keeping with metastases.

The patient underwent left radical nephrectomy, left lateral segmentectomy of the liver, and resection of liver mass in segment 6. Follow-up CT scan of the abdomen 1 month after surgery showed mark interval increase in size and number of liver metastases (Figure 3a). Targeted therapy with temsirolimus 25 mg administered by intravenous infusion once weekly was started.

Follow-up CT scan (Figure 3b) demonstrated interval

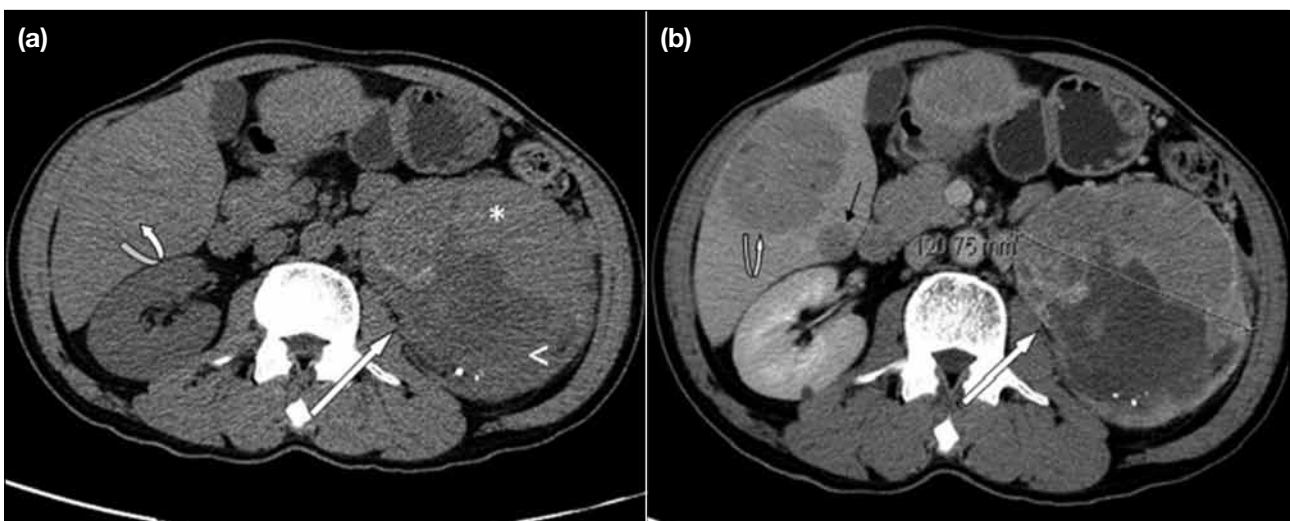


Figure 2. Computed tomography images of the abdomen of case 2. (a) A plain image shows a large heterogeneous mass lesion in the left kidney (arrow) with a cystic / necrotic component (arrowhead) and hyperdense solid component (asterisk), small metallic densities within the lesion due to previous embolisation, and a faint isodense mass in segment 6 of the liver (curved arrow); and (b) contrast-enhanced image demonstrates a large mass lesion with heterogeneous enhancement (white arrow) measuring 12 cm, hypoenhancement of the isodense segment 6 liver mass (curved arrow), and a smaller roundish hypoenhancing nodule (black arrow).

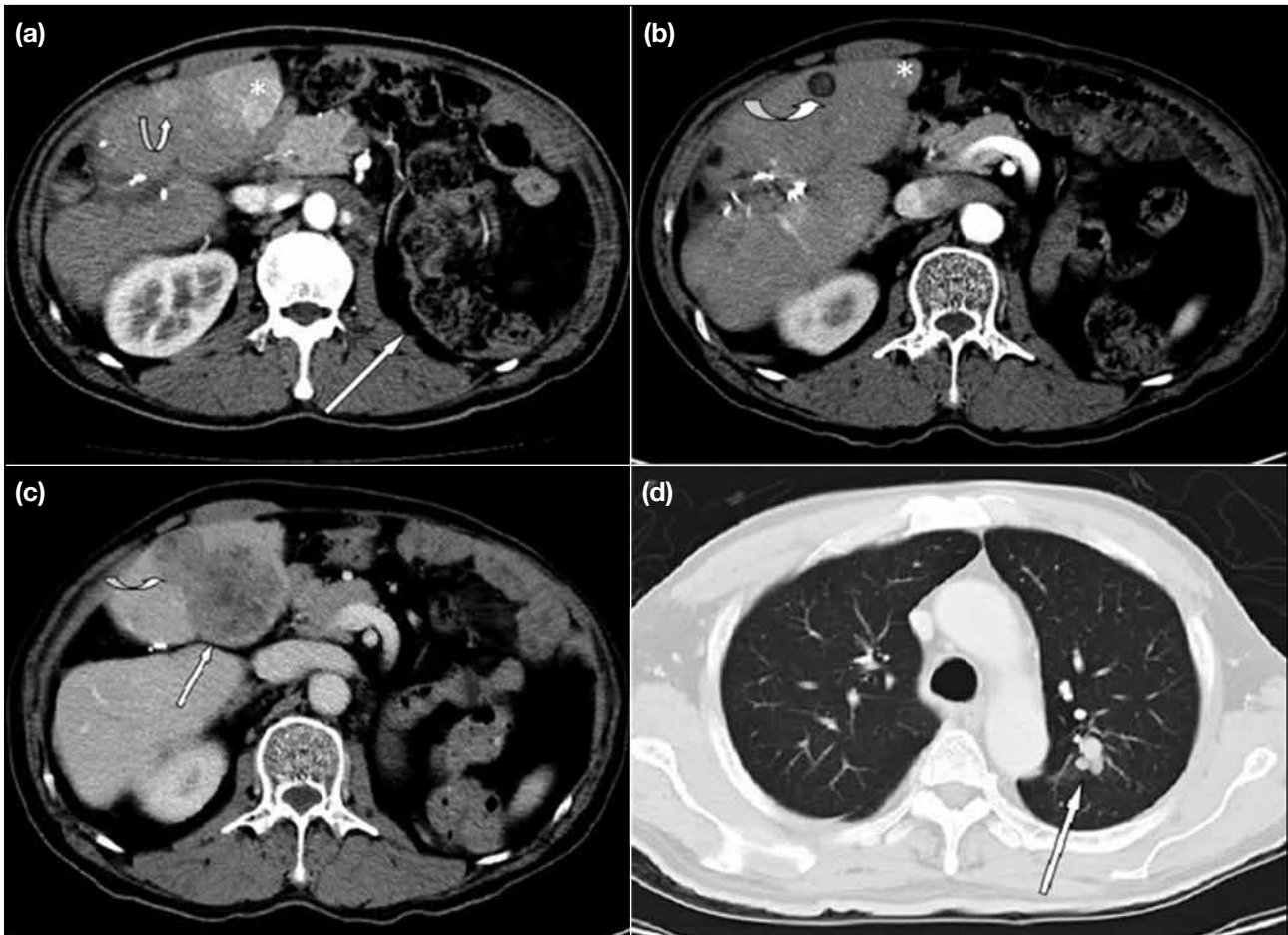


Figure 3. Contrast-enhanced computed tomography images of (a–c) the abdomen and (d) thorax of case 2. (a) One month after surgery shows evidence of left nephrectomy (arrow) and left lateral segmentectomy and resection of the liver mass in segment 6 of the liver — marked interval increase in size and number of liver metastasis are noted (curved arrow and asterisk); (b) 8 months after targeted therapy with temsirolimus shows interval decrease in size of segment 4b lesion (asterisk) — the roundish segment 4b lesion (curved arrow) shows interval decrease in size and is non-enhancing; (c) 1 year after targeted therapy demonstrates interval enlargement of the liver masses (arrow and curve arrow); and (d) image of the thorax in the lung window 1 year after targeted therapy shows new left lung upper lobe nodules (arrow).

decrease in size and number of liver metastases. However, subsequent CT of the abdomen 1 year after targeted therapy showed marked interval enlargement of the liver masses with new lung nodules in the left lung (Figures 3c and d). Temsirolimus was stopped.

DISCUSSION

Classic renal AML is a benign lesion that can usually be diagnosed confidently by imaging, with the presence of fat within the mass.⁹ Renal AML is generally managed conservatively with follow-up of interval abdominal imaging. Diagnosis of their lipid-poor counterparts is more challenging on imaging and may be difficult to differentiate from renal cell carcinoma.⁹ In these cases, CT-guided biopsy of the renal mass or partial nephrectomy may be needed for definitive diagnosis.

Epithelioid AML resembles renal cell carcinomas both radiologically and histologically.^{4,11} It has been suggested that some of the pathologically reported renal cell carcinomas in patients with TSC are actually epithelioid AML.⁵ Recently, epithelioid AML has been increasingly recognised and the diagnosis can be established by positive staining for melanocytic and smooth muscle markers, and the presence of perivascular epithelioid cells.⁴

Most studies show that no fat density or signal intensity can be identified by CT and magnetic resonance imaging, respectively, for epithelioid AML.^{1,4,8–10} Froemming et al,⁷ however, showed that six of nine patients with epithelioid AML had small foci of fat. Studies also show that epithelioid AML contains

no calcification,^{1,4,7-10} except for one study in which a patient had central calcification.⁷ Cystic change, necrosis, haemorrhage, renal vein invasion, lymph node adenopathy, or metastasis were present in a variable number of patients.^{1,4,7-9}

The sizes of the renal masses were relatively large in these patients, measuring 7 cm in patient 1 and 17 cm in patient 2. Both lesions have cystic or necrotic areas, together with enhancing solid components. The solid components in both lesions were hyperdense in pre-contrast studies. Patient 1 had haemorrhage into the renal sinus that was hypoechoic on USG, instead of the typical hyper-echogenicity of classic AML. Neither lesion demonstrated fat density, calcification, vascular invasion, nor perinephric spread. Patient 1 had hepatic metastasis at presentation. The provisional diagnoses for both patients were renal cell carcinoma.

The imaging features of these two patients are similar to those in other studies. This confirms that epithelioid AMLs can have a wide range of imaging appearances and behaviours that can be indistinguishable from renal cell carcinoma or AML with minimal fat.^{1,4,7-9}

The 2004 World Health Organization Classification of Tumours defined epithelioid AML of the kidney as a potentially malignant mesenchymal neoplasm, with reported metastasis in approximately one-third of the cases.¹² However, a study by He et al¹³ in 2013 suggested that the rate of aggressive behaviour among epithelioid AMLs was actually very low (5%).

Predictors of malignant outcome of renal epithelioid AML have been reported.^{13,14} Brimo et al¹⁴ conducted a study of 40 patients with atypical epithelioid AMLs, and found that larger tumour size, older age, and lymphovascular and renal vein invasion were seen more commonly in malignant epithelioid AMLs. These authors concluded that histological findings, including increased mitotic count (>2 per 10 high-power fields), necrosis, atypical mitotic figures, and nuclear atypia in more than 70% of cells were predictive of malignant behaviour.

Surgical resection has remained the mainstay of treatment for renal epithelioid AML.⁴ For patients with metastatic or recurrent epithelioid renal AML, chemotherapy may be useful. Epithelioid AML is part of the perivascular epithelioid cell tumour family and is considered to be chemosensitive.^{4,9}

Targeted therapies, including mammalian target of rapamycin inhibitors such as temsirolimus, may offer some hope for patients with progressive malignant epithelioid AMLs that are not amenable to surgical resection or other treatment modalities.^{15,16} Other reports have suggested controversial results, however.¹⁷

CONCLUSION

Renal epithelioid AML is a recently described rare variant of renal AML. The condition may occur sporadically or as part of TSC. Unlike its classic triphasic counterpart, the imaging appearances are similar to, and cannot be distinguished from, the more common renal cell carcinoma or AML with minimal fat. Renal epithelioid AML has diverse clinical behaviours, ranging from benign to aggressive and malignant. The correct diagnosis of renal epithelioid AML is important as the diagnosis affects the prognosis and management.

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