Incidental solid cystic renal lesion

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Abstract

The growing use of cross-sectional imaging has led to increasing detection of incidental lesions that previously remained undiscovered. These incidental lesions are unexpected, usually asymptomatic and are not related to the patient's presenting complaint or past medical history. Incidental findings in the kidneys are common and most of them are renal masses. On detection of such renal lesions, the question arises as to the diagnosis and subsequent management of these abnormalities.

Keywords: *Renal masses; incidental lesions; management.*

The growing use of cross-sectional imaging has led to increasing detection of incidental lesions that previously remained undiscovered. These incidental lesions are unexpected, usually asymptomatic and are not related to the patient's presenting complaint or past medical history. Incidental findings in the kidneys are common and most of them are renal masses. On detection of such renal lesions, the question arises as to the diagnosis and subsequent management of these abnormalities.

Many renal masses can be fully characterized using ultrasonography or contrast-enhanced computed tomography (CT). However, some may require additional imaging. Renal mass protocol CT or magnetic resonance imaging (MRI) (i.e. scans obtained before and after intravenous contrast material) allows most renal lesions to be completely characterized. The subsequent management also depends on patient co-morbidities and life expectancy.

In characterizing renal mass, in general it is important to first ensure that the mass is not the result of non-neoplastic conditions that may mimic a tumour. For example, focal bacterial pyelonephritis commonly causes a mass-like abnormality in the kidney. Other conditions include pseudotumours such as columns of Bertin, hypertrophied tissue adjacent to scars, vascular anomalies and aneurysms, infarcts, and infections. Renal masses are divided into cystic and solid lesions.

For cystic renal masses the lesions are characterized using the Bosniak system^[1–4]. This classifies cystic renal lesions according to CT features (Table 1). The Bosniak classification represents an imaging and clinical

management system and is not a pathological classification. Increasing complexity of the cyst is associated with greater risk of malignancy. In general, size is not a factor in the Bosniak classification of cystic renal masses, however, smaller mass are more likely to be benign. Therefore, the commonly encountered cystic-appearing renal mass that is too small to assess all its features, including its CT attenuation, can be presumed to be benign if it does not display any suspicious features.

Category I and II cysts are always benign and do not require further imaging follow-up. Active surveillance is recommended for indeterminate masses in Bosniak category IIF as a few may be malignant (approx. 5%). Category III and IV lesions are generally treated surgically in the general population as about a half of all category III lesions are malignant and nearly all category IV lesions are cystic cancers. However, surveillance is also an option for masses in categories III and IV in patients with limited life expectancy or co-morbidities that would increase the risk of treatment. Percutaneous biopsy of Bosniak category III renal masses is controversial but may be helpful especially in patients with co-morbidities as undergoing surgery may pose unacceptable risks. If a definitive malignant result is obtained with biopsy, surgery may be planned accordingly. However, a benign biopsy result is only helpful if it provides a definitive and specific diagnosis of a benign entity. A non-specific biopsy result should be viewed with caution and cannot be used alone to guide management. Bosniak category III masses typically contain few solid elements and it may be difficult to both target and obtain diagnostic material.

Table 1 The Bosniak cyst classification

	CT findings
Category I	Benign simple cysts: Hairline-thin walls. No septa, calcifications, solid components. No enhancement
Category II	Benign cystic lesions: Thin walls. Hairline-thin septa. Fine calcification in wall/septa. Minimal enhancement. Hyperdense non-enhancing cysts also included (<3 cm)
Category IIF	Complicated cystic lesions: Multiple hairline-thin septa; there may be minimal thickening of wall or septa, which may contain calcification that may be thick and nodular; there are no enhancing soft tissue components. Hyperdense non-enhancing cyst >3 cm
Category III	Indeterminate masses: Thick irregular walls or septa that show enhancement
Category IV	Malignant cystic masses: Thick irregular walls or septa that show enhancement, with enhancing soft tissue components

Solid masses are defined as those that contain little or no fluid attenuating (<20 HU) components and usually consist predominantly of enhancing tissue. As for cystic renal masses, all solid masses are first evaluated for features suggesting a non-neoplastic etiology, e.g. focal bacterial pyelonephritis. Further characterization depends on identifying fat within the renal mass as the only solid renal masses that can be reliably differentiated from renal cancer on CT or MRI are angiomyolipomas (AML). Macroscopic fat present in most AMLs has a characteristic appearance on CT and MRI. Occasionally, AMLs may contain such small amounts of fat that the fatty area cannot be identified on imaging. These are known as renal angiomyolipoma with minimal fat and may not be readily distinguished from malignant renal tumours. Angiomyolipoma with minimal fat typically presents as a hyperdense, T2-hypointense, homogeneously enhancing mass on CT/MRI. In such masses, percutaneous biopsy may be warranted.

The other common benign solid renal tumour is an oncocytoma. Imaging may reveal a central stellate scar in oncocytomas but this is not always a reliable sign and

it is not possible to distinguish between an oncocytoma and a renal cancer on imaging alone.

With the rare exception of an imaging diagnosis of benign angiomyolipomas, the subsequent management of a solid renal mass is then mostly dependent on size. Although there is no single feature of a renal mass that can be used to absolutely reliably predict its biologic behaviour accurately, size provides a reasonable and practical guide in management. Generally, large solid (>3 cm) renal masses are likely to be malignant and smaller solid mass are more likely to be benign.

Solid masses <1 cm should be observed. Such small lesions are difficult to characterize as partial volume effects can mimic enhancement. Thus, it can difficulty to confirm that masses of this size are enhancing and therefore are solid. Thin-section (<3 mm) CT and MRI are recommended when evaluating and observing such small masses. However, there are rare cases of aggressively behaving small renal cell carcinomas, so observation is not completely without risk.

Solid renal masses between 1 and 3 cm can be readily characterized as enhancing. Masses of this size may either undergo surgical resection or surveillance. These masses are large enough (unlike masses <1 cm) to be targeted for percutaneous biopsy. Biopsy can be used to provide a definitive diagnosis of oncocytoma and angiomyolipoma, the two most common benign neoplasms found following surgical resection of solid renal tumours.

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