JAMA Insights | CLINICAL UPDATE

Management of Small Kidney Tumors in 2019

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The management of incidentally discovered kidney tumors has changed recently because of improved understanding of their natural history and longer cancer-related survival. Usually found as incidental masses on diagnostic imaging, small kidney tumors are defined as lesions of 4 cm or smaller (American Joint Committee on Cancer stage T1a).[1] There has been a 3-fold increase in their detection during the past several decades coincident with increases in imaging utilization.[2] In the past, the conventional treatment for most kidney tumors was surgical resection, which mitigated risks of cancer progression but did not result in an overall survival benefit for small tumors.[2] More recent evidence suggests that not all of these lesions should be resected because some are benign, and for some patients with small kidney cancers, there is a greater risk for mortality from nononcologic causes than from kidney cancer.

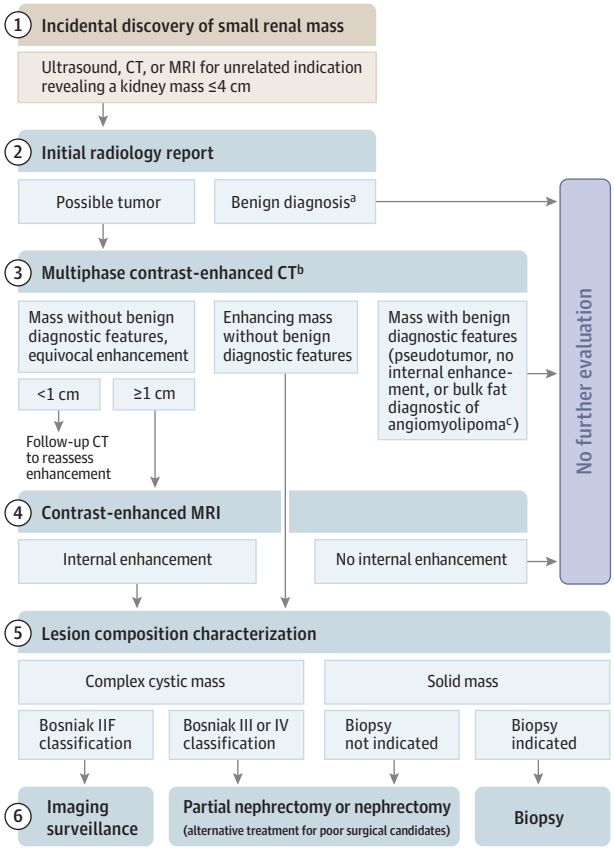
When determining the optimal treatment for patients with incidentally discovered kidney tumors, the wide range of mortality risk from the cancer, the potential for treatment-related harms, and mortality from comorbid conditions all must be considered when developing a treatment plan. The histology and potential for small kidney lesions to metastasize are highly variable, and imaging provides limited information about the likelihood of malignancy vs benign etiology (**Figure**). Imaging by computed tomography (CT) or magnetic resonance imaging (MRI) can be used to identify some benign features, such as bulk fat to indicate an angiomyolipoma or contour preservation and clinical context to suggest a pseudotumor (eg, focal pyelonephritis, focal infarct). Complex cystic lesions can be stratified based on imaging features to predict the likelihood of malignancy (Bosniak category ≥III). However, even malignant cystic lesions behave in an indolent fashion.[3]

Kidney tumors containing enhancing soft tissue on CT or MRI that do not have features diagnostic of benign etiology are considered malignant unless proven otherwise because 75% to 80% of such lesions are ultimately confirmed to be malignant. In the past, because the malignant potential for incidentally discovered small kidney tumors was unknown, they were usually resected.[4] This approach was not ideal because 20% to 25% of these tumors were benign, and many of the malignant lesions did not metastasize when patients were placed under observation.

Metastatic disease rates of only 1% to 2% were reported in observational studies of small kidney tumors managed by active surveillance over the course of 2 to 3 years.[5] The Delayed Intervention and Surveillance for Small Renal Masses registry for all small kidney tumors less than or equal to 4 cm supported that these tumors were generally indolent, with all patients who started with active surveillance having a 100% cancer-specific survival rate over 5 years.[6] The registry included small kidney tumors (representing either benign or malignant etiology) with a median follow-up of 2.1 years in the 223 patients who selected active surveillance, among whom 21 (9%) ultimately crossed over to treatment.[6] Although most cases of metastatic disease are due to the clear cell subtype of renal cell carcinoma, a better ability to predict metastatic potential, other than size and histologic subtype, is needed to allow for personalized decision making.

The approach to treating kidney tumors should be personalized based on the patient's individual needs. Treatment options include active surveillance (eg, for solid kidney tumors, assessment for growth on serial imaging tests), biopsy to guide treatment decisions, radical nephrectomy, and nephron-sparing treatments, including partial nephrectomy and percutaneous ablation. These approaches closely resemble those used for prostate cancer, another genitourinary cancer that frequently has an indolent course.

Figure. Considered Approaches to Diagnosis and Management of Small Kidney Tumors



[a] Benign diagnoses can be made from the appearance alone for a number of lesions including simple cysts (Bosniak I), cysts with few uniformly fine septa or fine calcification (Bosniak II), pseudotumors, focal pyelonephritis, vascular lesions, and kidney infarction.

[b] Magnetic resonance imaging (MRI) with contrast may be preferred to computed tomography (CT) in patients with moderate or severe decreases in kidney function or history of severe allergic reactions to iodinated intravenous contrast agents.

[c] For centrally located tumors consider renal sinus lipomatosis. Angiomyolipomas >3 cm may need follow-up imaging to monitor growth.

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Recognizing the low risk of developing metastatic disease from small lesions during observation, the 2017 American Urological Association guidelines recommend that patients with very small lesions (<2 cm) can undergo active surveillance for lesion growth (as an indirect indicator for potential aggressive behavior) instead of primary definitive surgical treatment (grade C recommendation, indicating a low level of certainty).[7] This treatment option necessitates that patients clearly understand the low level of cancer-specific mortality risk for these smallest lesions, and in the absence of medical comorbid conditions, patients should be provided options to pursue biopsy vs observation for tumor growth. Biopsies are used variably in different practice settings but are typically used in circumstances in which the results may alter management: (1) imaging features suggestive but not definitive of benign histology; or (2) there is uncertainty about whether the mass represents a primary kidney cortical neoplasm as opposed to a urothelial malignancy or metastatic lesion.

Current surgical techniques maximize kidney preservation when possible. Early studies documented the detrimental effect of total nephrectomy on kidney function, potentially affecting overall survival in patients because postoperative worsening of kidney function has been associated with increased cardiovascular mortality. The impact of postoperative worsening of kidney function on cardiovascular mortality has been particularly evident in patients with preexisting chronic kidney disease. Partial nephrectomy preserves the portion of the kidney not affected by tumor, and it results in cancer-specific outcomes equivalent to total nephrectomy. However, partial nephrectomy can also result in worsened kidney function and potentially increased mortality in patients with preexisting chronic kidney disease.[8] The anatomic location of the tumor influences the likelihood of worsened kidney function after surgery, based on how close the tumor is to the kidney vasculature or the urinary collecting system or the degree to which the tumor is surrounded by normal parenchyma.[9] Consequently, kidney functional outcomes are related to anatomic features of the tumor and not on its size alone.

Patients presenting with small kidney tumors are usually in their seventh decade (≥60 years) when diagnosed and have substantial comorbid disease. Because these patients have increased mortality after kidney tumor resection, guidelines support active surveillance when comorbidities are present.[7] Pretreatment life expectancy estimation based on comorbidity status can assess oncologic risk against the risk for comorbidity-related mortality when deciding on the best treatment approach for an individual patient.[10]

The lack of randomized trials providing evidence for the optimal approach to treat small kidney tumors leaves uncertainty regarding the most effective, risk-based criteria for treatment. For many patients, understanding the low cancer-specific mortality risk attributable to most small kidney tumors may help in arriving at a personalized decision to not proceed with initial surgical resection of the tumor. In the future, new tests may accurately identify aggressive small kidney tumors. Until then, efforts to support shared decision making for small kidney tumors may improve risk-based treatment selection.

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Published Online: April 1, 2019. doi:10.1001/jama.2019.1672

Conflict of Interest Disclosures: Dr Kang reports receipt of royalties from Wolters Kluwer outside the submitted work. Dr Bjurlin reports receipt of a grant from Astellas Pharma for speaking at Ultimate Medical Academy unrelated to this work. No other disclosures were reported.

Funding/Support: Dr Kang is supported by the National Cancer Institute (K07CA197134).

Role of the Funder/Sponsor: The National Cancer Institute and the National Institutes of Health had no role in the preparation, review, or approval of the manuscript or the decision to submit the manuscript for publication.

Disclaimer: The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Cancer Institute or the National Institutes of Health.

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