Renal Mass and Localized Renal Cancer: AUA Guideline

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Abbreviations and Acronyms

AHRQ = Agency for Healthcare Research and Quality
AS = active surveillance
AUA = American Urological Association
CKD = chronic kidney disease
CT = computerized tomography
eGFR = estimated glomerular filtration rate
GFR = glomerular filtration rate
LND = lymph node dissection
PN = partial nephrectomy
RCC = renal cell carcinoma
RMB = renal mass biopsy
RN = radical nephrectomy
TA = thermal ablation
TE = tumor enucleation

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Purpose: This AUA Guideline focuses on evaluation/counseling and management of adult patients with clinically localized renal masses suspicious for cancer, including solid-enhancing tumors and Bosniak 3/4 complex-cystic lesions.

Materials and Methods: Systematic review utilized research from the Agency for Healthcare Research and Quality and additional supplementation by the authors and consultant methodologists. Evidence-based statements were based on body of evidence strength Grade A/B/C (Strong/Moderate/Conditional Recommendations, respectively) with additional statements presented as Clinical Principles or Expert Opinions.

Results: Great progress has been made since the previous guidelines on management of localized renal masses were released (2009). The current guidelines provide updated, evidence-based recommendations regarding evaluation/counseling of patients with clinically localized renal masses, including the evolving role of renal mass biopsy. Given great variability of clinical, oncologic and functional characteristics, index patients are not utilized and the panel advocates individualized counseling/management. Management options (partial nephrectomy/radical nephrectomy/thermal ablation/active surveillance) are reviewed including recent data about comparative effectiveness and potential morbidities. Oncologic issues are prioritized while recognizing that functional outcomes are of great importance for survivorship for most patients with localized kidney cancer. A more restricted role for radical nephrectomy is recommended following well-defined selection criteria. Priority for partial nephrectomy is recommended for clinical T1a lesions, along with selective use of thermal ablation, particularly for tumors $\leq$3.0 cm. Important considerations for shared decision-making about active surveillance are explicitly defined.

Conclusions: Several factors should be considered during counseling/management of patients with clinically localized renal masses, including general health/comorbidities, oncologic potential of the mass, pertinent functional issues and relative efficacy/potential morbidities of various management strategies.

Key Words: kidney neoplasms, kidney diseases, nephrectomy, ablation techniques, watchful waiting

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BACKGROUND

Objective and Methods

This AUA Guideline focuses primarily on evaluation and management of clinically localized renal masses suspicious for renal cell carcinoma in adults, including solid enhancing renal tumors and Bosniak 3/4 complex cystic masses. Some patients with clinically localized renal masses may present with findings suggestive of aggressive tumor biology or may be up staged on exploration or final pathology. Management considerations pertinent to the urologist for such patients are also addressed.

The ensuing guideline reflects significant advances in the field of kidney cancer since the initial AUA guideline on this topic was released in 2009.[1] Importantly, "index patients" have been removed, reflecting the complex interaction between patient, tumor and functional characteristics that influences management. The current guidelines are supported by a comprehensive systematic review performed by Agency for Healthcare Research and Quality, a project that was nominated and supported by the AUA.[2] The systematic review focused on contemporary literature regarding diagnostic imaging, the role of renal mass biopsy and the comparative efficacy/potential morbidities of the various management strategies for clinically localized disease.

Epidemiology

Renal masses are a biologically heterogeneous group of tumors ranging from benign masses to cancers that can be indolent or aggressive.[3,4] While the true incidence of renal masses (including benign and malignant) is unknown, there were an estimated 62,000 new cases of RCC in the United States in 2016 and 300,000 worldwide.[5] Incidence rates have increased dramatically over the past few decades, with the highest incidence in developed countries, believed to be due to increased use of axial imaging and longer life expectancies.[6]

Presentation/Diagnosis

Greater than 50% of renal masses are diagnosed incidentally with only a minority of patients in contemporary series presenting with symptoms.[7] The "classic triad" of symptoms (hematuria/flank pain/abdominal mass) are most often associated with locally advanced or metastatic RCC.

Tumor Characteristics

The vast majority (>90%) of kidney cancers are renal cortical tumors known as RCC. The major subclassifications of RCC include, but are not limited to, clear cell, papillary and chromophobe; each subtype has distinct morphologic appearance, clinical characteristics and prognostic significance.[8] Prognosis is determined primarily by pathological stage and is favorable (80-90% at 5-years) for most patients with clinically localized disease (Stage I-II).[7]

Overview of Treatment Alternatives

The guideline statements focus on partial nephrectomy, radical nephrectomy, thermal ablation and active surveillance for the management of clinically localized renal masses (figure 1). PN and RN are the most widely utilized surgical strategies, and data regarding comparative efficacy and potential morbidities are robust.[2] Radiofrequency ablation and cryoablation are the most widely investigated and integrated modalities for TA.[2] AS has emerged as an initial management strategy for patients with cT1a (<4 cm) renal masses, and necessitates serial imaging to evaluate for tumor progression and growth rates.

GUIDELINE STATEMENTS

Evaluation and Diagnosis

1. In patients with a solid or complex cystic renal mass, physicians should obtain high quality, multiphase, cross-sectional abdominal imaging to optimally characterize and clinically stage the renal mass. Characterization of the renal mass should include assessment of tumor complexity, degree of contrast enhancement (where applicable) and presence or absence of fat. (Clinical Principle)

Multiphasic cross-sectional imaging with CT or magnetic resonance imaging is essential for assessing malignant potential and counseling about management options. Male sex and tumor size are the most reliable predictors of malignancy, however degree and patterns of enhancement and tumor complexity can provide distinct data points on which to base the risk of malignancy, select intervention and estimate risk of complications.[2,9–12] Presence of macroscopic fat is essentially diagnostic for benign angiomyolipoma.[2,9–12]

2. In patients with suspected renal malignancy, physicians should obtain comprehensive metabolic panel, complete blood count and urinalysis. Metastatic evaluation should include chest imaging to evaluate for possible thoracic metastases. (Clinical Principle)

Appropriate metastatic evaluation and assessment of renal function are essential to shared decision-making for these patients. Extra renal manifestations of RCC or poor health may manifest as electrolyte abnormalities, anemia, hypercalcemia, elevated hepatic function tests or increased alkaline phosphatase (hepatic or bone disease or metastases). Pulmonary metastases are the most

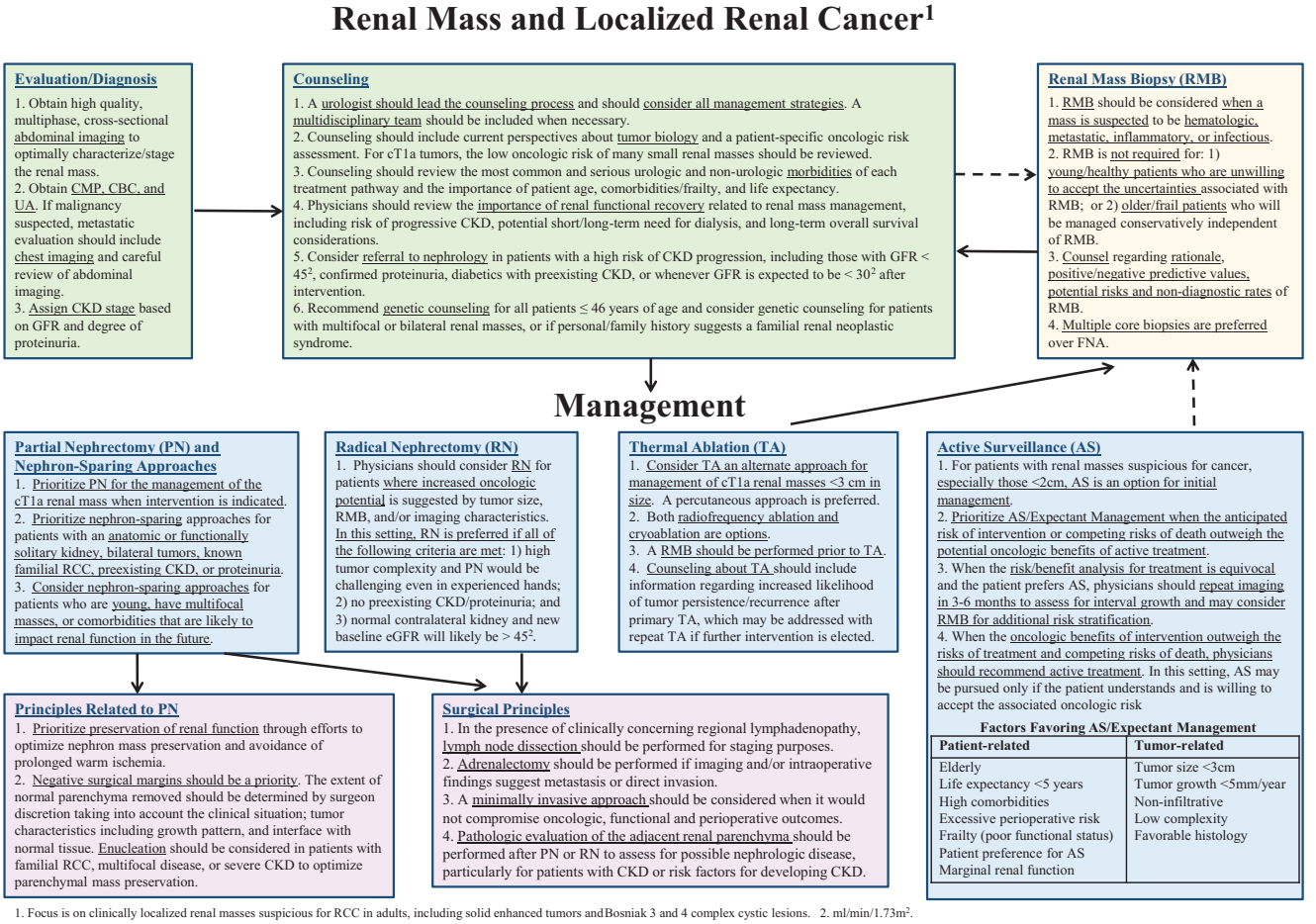

Figure. Renal mass and localized renal cancer treatment algorithm

common site of metastatic disease and are evaluated with either chest radiography or CT scan based on risk of metastases.[7]

3. For patients with a solid or complex cystic renal mass, physicians should assign CKD stage based on eGFR and degree of proteinuria. (Expert Opinion)

Renal function and its prognostic implications can be assessed with serum creatinine (to calculate an estimated glomerular filtration rate) and urinalysis to screen for proteinuria (supplementary fig. 1, http://jurology.com/). Protein on urine dipstick should trigger quantitative measurement (protein or albumin-to-creatinine ratio).[13,14] An assessment of eGFR and proteinuria has important implications regarding potential management options and involvement of a nephrologist (see guideline statements 8, 14-17, 19).

Counseling

4. For patients with a solid or Bosniak 3/4 complex cystic renal mass, a urologist should lead the counseling process and should consider all management strategies. A multidisciplinary team should be included when necessary. (Expert Opinion)

Given the complexities underlying the natural history and management of localized renal masses, a urologist is best suited to lead the evaluation and counseling of these patients.[2] Additional involvement by other specialists may be considered based on specific factors.

5. Physicians should provide counseling that includes current perspectives about tumor biology and a patient-specific risk assessment inclusive of sex, tumor size/complexity, histology (when obtained) and imaging characteristics. For cT1a tumors, the low oncologic risk of many small renal masses should be reviewed. (Clinical Principle)

A number of important parameters can be used to advise patients about their risk of malignancy and death from a localized renal mass, and should be discussed as it could impact individualized decision-making.[2] Overall, 20-25% of T1a tumors are benign, and only about 20% are high grade or locally

invasive.[2,15] The limited short-term oncologic risks of cT1a tumors should be reviewed.

6. During counseling of patients with a solid or Bosniak 3/4 complex cystic renal mass, physicians must review the most common and serious urological and non-urological morbidities of each treatment pathway, and the importance of patient age, comorbidities/frailty and life expectancy. (Clinical Principle)

Each management strategy for localized renal masses is associated with a unique profile of perioperative morbidities, renal functional outcomes and health-related quality of life implications.[2,16] Age, comorbidities and life expectancy help determine overall survival, may impact the risk profile for intervention and should be discussed.[2,16,17]

7. Physicians should review the importance of renal functional recovery related to renal mass management, including the risk of progressive CKD, potential short- or long-term need for renal replacement therapy and long-term overall survival considerations. (Clinical Principle)

All management strategies for localized renal masses have implications for short and long-term renal function, and should be reviewed. Numerous variables can influence functional outcomes including the amount of parenchyma removed/ablated, ischemia type/duration, patient age/comorbidities and presence of preexisting CKD.[18,19] Patients with preexisting CKD (or proteinuria) due to medical etiologies have decreased overall survival and are at increased risk for progressive decline in renal function.[20,21] Nephron-sparing approaches should be prioritized in this setting.

8. Physicians should consider referral to nephrology for patients with a high risk of CKD progression. Such patients may include those with eGFR less than 45 ml/min/1.73 m^2, confirmed proteinuria, diabetics with preexisting CKD or whenever eGFR is expected to be less than 30 ml/min/1.73 m^2 after intervention. (Expert Opinion)

Certain patients are at high risk for progression of CKD postoperatively (supplementary fig. 1, http://jurology.com/).[13] Decline in renal function related to nephron-mass loss in these patients may be exacerbated by resultant hyperfiltration and potential sequelae of preexisting comorbidities. Nephrology referral will ensure proper management and functional surveillance of these patients.

9. Physicians should recommend genetic counseling for all patients ≤46 years of age with renal malignancy, and consider genetic counseling for patients with multifocal or bilateral renal masses, or if personal or family history suggests a familial renal neoplastic syndrome. (Expert Opinion)

Recognition of patients with familial RCC allows for proactive management and screening of blood relatives which may lessen the morbidity/mortality of these syndromes (supplementary table, http://jurology.com/).[7] Hereditary RCC typically presents at a younger age, and patients with a renal mass who are ≤46 years old should be considered for genetic evaluation.[22,23]

Renal Mass Biopsy

10. Renal mass biopsy should be considered when a mass is suspected to be hematologic, metastatic, inflammatory or infectious. (Clinical Principle)

If the radiographic or clinical picture suggests metastatic cancer, RMB can identify metastasis from another primary malignancy and lymphoma, both of which are typically treated systemically.[1,7] When there is concern for an inflammatory or infectious process, RMB can confirm diagnosis, direct therapy and provide drainage.[1,7]

11. In the setting of a solid renal mass, RMB is not required for 1) young or healthy patients who are unwilling to accept the uncertainties associated with RMB, or 2) older or frail patients who will be managed conservatively independent of RMB findings. (Expert Opinion)

RMB is not indicated when it is unlikely to alter management recommendations or patient choice. Young/healthy patients may be unwilling to accept the possibility of a non-diagnostic or false-negative result and may elect intervention regardless of RMB outcome. Some old/frail patients are not healthy enough to undergo intervention and would be managed conservatively (expectant management) even if RMB suggested malignancy.[7]

12. When considering the utility of RMB, patients should be counseled regarding rationale, positive and negative predictive values, potential risks and non-diagnostic rates of RMB. (Clinical Principle)

RMB can be an important diagnostic adjunct, as a definitive benign diagnosis may preclude treatment and risk stratification may aide in patient counseling. Complications of RMB include renal hematoma (4.9%), clinically significant pain (1.2%), gross hematuria (1.0%), pneumothorax (0.6%) and hemorrhage requiring transfusion (0.4%).[2,16,24–26] There have been no reported cases of RCC tumor seeding in the contemporary literature. A diagnosis of malignancy at RMB can be trusted with certainty, with sensitivity of 97.5%, specificity of 96.2% and positive predictive value of 99.8%.[24] However, a non-malignant biopsy result may not truly indicate

that a benign entity is present.[24] The non-diagnostic rate of RMB is ~14%, which can be substantially reduced with repeat biopsy.[27] When assigned, histologic determination of RCC subtype is highly accurate, but accuracy for tumor grade is variable.[24,27]

13. For patients with a solid renal mass who elect RMB, multiple core biopsies are preferred over fine needle aspiration. (Moderate Recommendation; Evidence Level: Grade C)

RMB may be performed under CT or ultrasound guidance, with at least 2-3 cores being obtained with a 16-18 gauge needle to optimize diagnostic yield.[2]

MANAGEMENT

Partial Nephrectomy and Nephron-Sparing Approaches

14. Physicians should prioritize PN for the management of the cT1a renal mass when intervention is indicated. In this setting, PN minimizes risk of CKD or CKD progression and is associated with favorable oncologic outcomes, including excellent local control. (Moderate Recommendation; Evidence Level: Grade B)

The European randomized trial suggests that PN provides similar oncologic outcomes when compared to RN for clinically localized small (<5 cm) renal masses,[28] and the AHRQ systematic review reaffirms this for appropriately selected patients.[2,16] Meta-analysis further documents that PN is associated with less decline in GFR and a lower incidence of CKD compared to RN (supplementary figs. 2 and 3, http://jurology.com/).[2] PN also provides more favorable local recurrence-free survival compared to a single session of TA (supplementary fig. 4, http://jurology.com/).[2] PN can be associated with urological complications but most can be managed successfully with conservative measures. Many small renal masses have low short-term oncologic risk and RN should be avoided if possible.[15]

15. Physicians should prioritize nephron-sparing approaches for patients with solid or Bosniak 3/4 complex cystic renal masses and an anatomic or functionally solitary kidney, bilateral tumors, known familial RCC, preexisting CKD or proteinuria. (Moderate Recommendation; Evidence Level: Grade C)

Absolute indications for nephron-sparing approaches include situations when RN would render the patient anephric or high risk for renal replacement therapy.[1] These include patients with anatomic or functionally solitary kidney, bilateral tumors or known familial RCC.[1] While patients with familial RCC have two functional kidneys, they are likely to experience tumor recurrence and require multiple renal interventions throughout their lifetime. Patients with preexisting CKD or proteinuria are at higher risk for progressive CKD and end-stage renal disease, and nephron-sparing approaches should also be prioritized in these patients.[13]

16. Physicians should consider nephron-sparing approaches for patients with solid or Bosniak 3/4 complex cystic renal masses who are young, and have multifocal masses or comorbidities that are likely to impact renal function in the future, such as moderate to severe hypertension, diabetes mellitus, recurrent urolithiasis or morbid obesity. (Conditional Recommendation; Evidence Level: Grade C)

Young patients who have longer life expectancy are theoretically at risk of recurrent and/or contralateral disease as well as competing health risks that can impact renal function over their remaining lifetime. Patients with multifocal tumors may have familial RCC and will often require multiple renal interventions throughout their lifetime.[22] Patients with significant risk for future CKD, such as those with severe hypertension, diabetes mellitus, strong stone diathesis or morbid obesity, should also be considered for nephron-sparing approaches to maximize their remaining renal function.[13]

17. For patients who elect PN, physicians should prioritize preservation of renal function through efforts to optimize nephron mass preservation and avoid prolonged warm ischemia. (Expert Opinion)

One of the main objectives of PN is to preserve renal function, which is particularly important in patients with a solitary kidney, bilateral disease or preexisting CKD/proteinuria.[13] However, even when PN is performed electively, there may be value in optimizing renal function on a long-term basis.[1] The recent literature indicates that the main determinant of functional recovery after PN is nephron-mass preservation.[19] The exact threshold of warm ischemia at which irreversible damage begins to occur is not well defined, although most studies suggest approximately 25-30 minutes.[19] In general, recovery from cold ischemia is more reliable with intervals of 60-90 minutes being well tolerated.[19]

18. For patients undergoing PN, negative surgical margins should be a priority. The extent of normal parenchyma removed should be determined by surgeon discretion taking into account the clinical situation, tumor characteristics including growth pattern and interface with normal tissue. Tumor

enucleation should be considered in patients with familial RCC, multifocal disease or severe CKD to optimize parenchymal mass preservation. (Expert Opinion)

Recent studies suggest inferior oncologic outcomes in patients with positive surgical margins after PN.[29] The concept of tumor enucleation originated in the familial RCC population as a technique to optimally preserve parenchyma in patients with multiple tumors.[30] Utilization of TE for sporadic tumors remains controversial as most studies have been retrospective and potentially subject to selection bias.[31] Until prospective evaluation is available, TE is best utilized selectively, taking into account patient and tumor characteristics, including growth pattern and interface with normal parenchyma.[31]

Radical Nephrectomy

19. Physicians should consider RN for patients with a solid or Bosniak 3/4 complex cystic renal mass when increased oncologic potential is suggested by tumor size, RMB and/or imaging characteristics and in whom active treatment is planned. (Conditional Recommendation; Evidence Level: Grade B) In this setting, RN is preferred if all of the following criteria are met: 1) high tumor complexity and PN would be challenging even in experienced hands, 2) no preexisting CKD or proteinuria, and 3) normal contralateral kidney and new baseline eGFR will likely be greater than 45 ml/min/1.73 m^2. (Expert Opinion)

Patients with aggressive appearing tumor, no preexisting CKD/proteinuria and a normal contralateral kidney that can provide new baseline GFR >45 ml/min/1.73 m^2 should be considered for RN, particularly if there is high tumor complexity that will make PN challenging even in experienced hands.[20,21] In this setting, the risk of perioperative morbidity with PN will be increased and oncologic outcomes may also be compromised.[32] Increased oncologic risk can be suggested by a larger tumor along with high grade/aggressive histology (if RMB has been obtained) or imaging findings suggesting an infiltrative appearance or locally invasive phenotype.[32,33] Beyond this, most cT1b/T2 tumors can be considered for PN. Patients with CKD primarily due to surgery have survival that approximates that of patients with no CKD even after surgery as long as new baseline GFR is >45 ml/min/1.73 m^2.[21]

Surgical Principles

20. For patients who are undergoing surgical excision of a renal mass with clinically concerning regional lymphadenopathy, physicians should perform a lymph node dissection for staging purposes. (Expert Opinion)

If suspicious lymphadenopathy is identified on imaging or during surgical exploration, a lymph node dissection should be performed primarily for staging and prognostic purposes.[34] Selective performance of LND for patients who may have locally advanced disease can also be considered for staging purposes.[34] Recent studies have been unable to confirm a survival benefit of LND for RCC.[35] If lymph node involvement is confirmed on final pathology, medical oncology consultation should be considered. Level 1 evidence has contributed to strong consensus that LND need not be performed in patients with localized kidney cancer and clinically negative nodes.[36]

21. For patients who are undergoing surgical excision of a renal mass, physicians should perform adrenalectomy if imaging and/or intraoperative findings suggest metastasis or direct invasion of the adrenal gland. (Clinical Principle)

Adrenalectomy should be performed if preoperative imaging or intraoperative inspection suggests metastasis or adrenal enlargement other than a well-characterized non-functioning adenoma.[34] In this setting, adrenalectomy has important prognostic utility and may occasionally have therapeutic potential. Adrenal involvement with RCC is a poor prognostic finding and if confirmed on final pathology, medical oncology consultation should be considered.[37] Several studies have shown that occult adrenal involvement is uncommon in patients with clinically localized kidney cancer, and the adrenal gland can be spared in this setting without compromising oncologic outcomes.[34]

22. In patients undergoing surgical excision of a renal mass, a minimally invasive approach should be considered when it would not compromise oncologic, functional and perioperative outcomes. (Expert Opinion)

While minimally invasive approaches can facilitate more rapid convalescence, patient safety and adherence to prior guideline statements regarding oncologic outcomes, indications for nephron-sparing surgery and preservation of renal function should be prioritized.[1,2,38] A minimally invasive approach should be considered only when it will not compromise oncologic, functional or perioperative outcomes.

23. Pathologic evaluation of the adjacent renal parenchyma should be performed after PN or RN to assess for possible intrinsic renal disease, particularly for patients with CKD or risk factors for developing CKD. (Clinical Principle)

For patients with CKD or related risk factors, identification of intrinsic renal disease may facilitate more rational patient management and improve long-term functional outcomes.

Thermal Ablation

24. Physicians should consider thermal ablation as an alternate approach for the management of cT1a renal masses <3 cm in size. For patients who elect TA, a percutaneous technique is preferred over a surgical approach whenever feasible to minimize morbidity. (Conditional Recommendation; Evidence Level: Grade C)

Current data suggest that intermediate-term metastasis-free survival and cancer-specific survival rates for PN and TA are comparable.[2] However, TA is associated with higher local recurrence rates compared to PN when analyzing only the primary treatment (supplementary fig. 4, http://jurology.com/).[2,16] These differences largely disappear when additional salvage therapies are also considered (supplementary fig. 5, http://jurology.com/).[2] TA results in similar renal functional outcomes compared to PN, and has a favorable morbidity profile compared to PN and RN.[2] While percutaneous and laparoscopic approaches to TA have similar efficacy, the percutaneous approach is associated with less morbidity and should be the preferred approach. Efficacy for TA is strongest for tumors <3 cm diameter and lesion size is thus an important consideration for patient selection.[2,39,40]

25. Both radiofrequency ablation and cryoablation are options for patients who elect thermal ablation. (Conditional Recommendation; Evidence Level: Grade C)

Available data suggest that there are no significant outcome differences between cryoablation and radiofrequency ablation as defined by complications, metastatic progression or cancer-specific survival.[2,16]

26. A renal mass biopsy should be performed prior to ablation to provide pathologic diagnosis and guide subsequent surveillance. (Expert Opinion)

The differential diagnosis for solid, enhancing renal masses includes RCC as well as benign tumors, non-RCC malignancies and metastatic lesions.[7] Because TA leads to tissue necrosis it will not allow subsequent histological diagnosis. Therefore, RMB prior to TA is the only opportunity to render a definitive diagnosis in patients who elect a TA strategy.[1,2]

27. Counseling about thermal ablation should include information regarding an increased likelihood of tumor persistence or local recurrence after primary thermal ablation relative to surgical extirpation, which may be addressed with repeat ablation if further intervention is elected. (Strong Recommendation; Evidence Level: Grade B)

Please see supplementary figures 4 and 5 (http://jurology.com/), and discussion for Statement 24.

Active Surveillance and Expectant Management

A decision to pursue AS or expectant management requires an objective baseline evaluation of patient, tumor and treatment-related factors (see table and supplementary fig. 6, http://jurology.com/), preferably with formal decision-making tools. This should lead to a well-communicated risk-benefit analysis unique to individual patient circumstances.

28. For patients with small, solid or Bosniak 3/4 complex cystic renal masses, especially those <2 cm, AS is an option for initial management. (Conditional Recommendation; Evidence Level: Grade C)

Short-term (12-36 months) published cancer-specific survival rates with AS exceed 95% in well selected patients with small (mostly <2 cm) masses.[2,41–43] When the oncologic risks are particularly low, AS is an acceptable initial option for

Table. *Patient and tumor related factors favoring active surveillance/expectant management versus intervention*

	Patient-related Factors	Tumor Factors
Favor active surveillance or expectant management	Elderly Life expectancy <5 years High comorbidities Excessive perioperative risk Poor functional status Marginal renal function Patient preference to avoid treatment risks	Tumor size <3cm Tumor growth <5mm per year Non-infiltrative on imaging Low complexity Favorable histology (if RMB performed)
Favor intervention	Young Life expectancy >5 years Low comorbidity Acceptable perioperative risk Good functional status Anticipate adequate renal function following intervention Patient preference for treatment	Tumor size >3cm Tumor growth >5mm per year Infiltrative on imaging High complexity Unfavorable histology (if RMB performed)

management in all patients, not just those with limited life expectancy or poor performance status.

29. For patients with a solid or Bosniak 3/4 complex cystic renal mass, physicians should prioritize active surveillance/expectant management when the anticipated risk of intervention or competing risks of death outweigh the potential oncologic benefits of active treatment. (Clinical Principle)

For patients with limited life expectancy or who have unacceptable surgical risks, surveillance is a rational strategy that can avoid serious perioperative complications.[41–43] Many localized small renal masses are indolent at inception and of less clinical significance than competing comorbidities in populations at risk.[15]

30. For patients with a solid or Bosniak 3/4 complex cystic renal mass in whom the risk/benefit analysis for treatment is equivocal and who prefer AS, physicians should repeat imaging in 3-6 months to assess for interval growth and may consider RMB for additional risk stratification. (Expert Opinion)

When the risk/benefit analysis for intervention is equivocal but the patient prefers AS, diligent follow-up at 3-6 months is recommended. Patients should be informed that the risks of metastases are low (<3%) but not zero in the short term.[2,41–43] Tumor size and complexity, infiltrative appearance and interval growth may all predict progression, and patient status should be reassessed with each clinical encounter (see table).

31. For patients with a solid or Bosniak 3/4 complex cystic renal mass in whom the anticipated oncologic benefits of intervention outweigh the risks of treatment and competing risks of death, physicians should recommend active treatment. In this setting, AS with potential for delayed intervention may be pursued only if the patient understands and is willing to accept the associated oncologic risk. (Moderate Recommendation; Evidence Level: Grade C)

Metastatic RCC remains incurable.[7] When the oncologic and survival benefits of intervention outweigh the risks of surveillance and competing risks of death, physicians should recommend a proactive approach. Patients with few comorbidities and good life expectancy should be prioritized for intervention, particularly when the renal mass is >3 cm and/or demonstrates growth of >5 mm/year.[2,41–43]

FUTURE DIRECTIONS

The ideal routes to advance the field of localized renal cancer include clinical trials, collaborative quality initiatives, novel diagnostics/biomarkers, and improved technologies and systemic therapies. Each of these requires an unrelenting commitment to continuous clinical improvement and scientific investigation.

Evaluation/Diagnosis

Tumor radiomics and molecular imaging hold promise to improve our ability to discriminate tumor histology and grade.[44,45] Biomarkers identified through The Cancer Genome Atlas[46–48] will need to be developed into more clinically useful assays for diagnosing and monitoring purposes, potentially using circulating tumor cells.[49]

Counseling/Outcomes-based Research

Increased quality of data, including improved assessment of tumor biology and prospective trials of management options, is needed to facilitate more intelligent patient counseling. The development of aids for informed medical decision-making is ongoing.[50]

Management

Randomized prospective trials comparing PN and RN,[32] AS and intervention, TA and PN, and standard PN and TE[31] should be prioritized to assess oncologic and functional outcomes, and treatment-related morbidities. Non-extirpative methods, including stereotactic body radiation therapy, high-intensity focused ultrasound, microwave ablation and laser interstitial thermal therapy, are still investigational.

DISCLAIMER

This document was written by the Renal Mass and Localized Kidney Cancer Guideline Panel of the American Urological Association Education and Research, Inc., which was created in 2015. The Practice Guidelines Committee (PGC) of the AUA selected the committee chair. Panel members were selected by the chair. Membership of the panel included specialists in urology, oncology, pathology, radiology, nephrology, and endourology with specific expertise on this disorder. The mission of the panel was to develop recommendations that are analysis-based or consensus-based, depending on panel processes and available data, for optimal clinical practices in the treatment of renal masses and localized kidney cancer.

Funding of the panel was provided by the AUA. Panel members received no remuneration for their work. Each member of the panel provides an ongoing conflict of interest disclosure to the AUA.

While these guidelines do not necessarily establish the standard of care, AUA seeks to recommend and to encourage compliance by practitioners with

current best practices related to the condition being treated. As medical knowledge expands and technology advances, the guidelines will change. Today these evidence-based guidelines statements represent not absolute mandates but provisional proposals for treatment under the specific conditions described in each document. For all these reasons, the guidelines do not pre-empt physician judgment in individual cases.

Treating physicians must take into account variations in resources, and patient tolerances, needs, and preferences. Conformance with any clinical guideline does not guarantee a successful outcome. The guideline text may include information or recommendations about certain drug uses ("off label") that are not approved by the Food and Drug Administration (FDA), or about medications or substances not subject to the FDA approval process. AUA urges strict compliance with all government regulations and protocols for prescription and use of these substances. The physician is encouraged to carefully follow all available prescribing information about indications, contraindications, precautions and warnings. These guidelines and best practice statements are not intended to provide legal advice about use and misuse of these substances.

Although guidelines are intended to encourage best practices and potentially encompass available technologies with sufficient data as of close of the literature review, they are necessarily time-limited. Guidelines cannot include evaluation of all data on emerging technologies or management, including those that are FDA-approved, which may immediately come to represent accepted clinical practices.

For this reason, the AUA does not regard technologies or management which are too new to be addressed by this guideline as necessarily experimental or investigational.

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