

## Excise, Ablate or Observe: The Small Renal Mass Dilemma—A Meta-Analysis and Review

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**Purpose:** The incidence of renal cell carcinoma is increasing due to the incidental detection of small renal masses. Resection, predominantly by nephron sparing surgery, remains the standard of care due to its durable oncological outcomes. Active surveillance and ablative technologies have emerged as alternatives to surgery in select patients. We performed a meta-analysis of published data evaluating nephron sparing surgery, cryoablation, radio frequency ablation and observation for small renal masses to define the current data.

**Materials and Methods:** A MEDLINE® search was performed for clinically localized sporadic renal masses. Patient age, tumor size, duration of followup, available pathological data and oncological outcomes were evaluated.

**Results:** A total of 99 studies representing 6,471 lesions were analyzed. Significant differences in mean patient age ( $p < 0.001$ ), tumor size ( $p < 0.001$ ) and followup duration ( $p < 0.001$ ) were detected among treatment modalities. The incidence of unknown/indeterminate pathological findings was significantly different among cryoablation, radio frequency ablation and observation ( $p = 0.003$ ), and a significant difference in the rates of malignancy among lesions with known pathological results was detected ( $p = 0.001$ ). Compared to nephron sparing surgery significantly increased local progression rates were calculated for cryoablation (RR = 7.45) and radio frequency ablation (RR = 18.23). However, no statistical differences were detected in the incidence of metastatic progression regardless of whether lesions were excised, ablated or observed.

**Conclusions:** Nephron sparing surgery, ablation and surveillance are viable strategies for small renal masses based on short-term and intermediate term oncological outcomes. However, a significant selection bias exists in the application of these techniques. While long-term data have demonstrated durable outcomes for nephron sparing surgery, extended oncological efficacy is lacking for ablation and surveillance strategies. The extent to which treatment alters the natural history of small renal masses is not yet established.

*Key Words:* kidney; kidney neoplasms; carcinoma, renal cell; natural history; nephrectomy

Cancer of the kidney accounts for approximately 3.5% of all malignancies and it is the third most common cancer of the urinary tract.<sup>1</sup> With an estimated 51,190 new cases occurring in 2007 and 12,890 deaths attributable to the disease RCC is the most lethal of all genitourinary tumors.<sup>1</sup>

The clinical diagnosis of RCC is radiographic and effective imaging of the kidneys can be achieved by ultrasound, CT or MRI.<sup>2</sup> Solid lesions detected by ultrasound and those showing enhancement on cross-sectional imaging are considered malignant until proven otherwise. Due to the increased use of diagnostic imaging for evaluating patients with abdominal symptomatology incidentally discovered SRMs are being diagnosed with greater frequency<sup>3</sup> and they now account for 48% to 66% of RCC diagnoses.<sup>4</sup> This has resulted in an increased incidence of RCC during the last 3 decades with an associated stage migration<sup>3</sup> and a concurrent increase in the rates of surgical intervention.<sup>5</sup> Unfortunately despite earlier diagnosis and treatment there has not been a significant increase in CSS or overall survival.<sup>5</sup>

The standard of care for clinically localized RCC remains surgical resection due to the favorable prognosis associated with surgery and the relative ineffectiveness of systemic therapy. Patients undergoing radical or partial nephrectomy for pT1a (4 cm or less) tumors have demonstrated 5-year CSS rates in excess of 95%.<sup>6,7</sup> Laparoscopic approaches to NSS have shown similarly favorable early results.<sup>8</sup>

Recently minimally invasive ablative technologies have emerged as potential treatment options for clinically localized RCC. Effective renal cryoablation has been achieved by open and laparoscopic approaches as well as by percutaneous image guided techniques.<sup>9</sup> Percutaneous RFA has been successfully performed under ultrasound, CT or MRI guidance.<sup>10</sup> While these newer nephron sparing techniques appear promising, data on their long-term effectiveness are lacking.

A small but emerging body of data exists regarding observation or active surveillance of selected SRMs in elderly populations. A meta-analysis of clinically localized tumors determined an overall median growth rate of 0.28 cm per

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