Salvage Surgery After Renal Mass Ablation

Brian W. Cross, MD[a], Daniel C. Parker, MD[a], Michael S. Cookson, MD[b,*]

KEYWORDS

• Kidney cancer • Ablation • Salvage • Cryotherapy • Radiofrequency ablation • Microwave ablation

KEY POINTS

- Renal mass ablation may be indicated in certain clinical scenarios for patients with small renal masses who are not candidates for standard extirpative therapy.
- Based on available data, the oncologic efficacy of renal mass ablation may be suboptimal when compared with surgical excision.
- There are no universal definitions of treatment success or tumor recurrence following renal mass ablation, but most advocate for tumor biopsy for pathologic confirmation.
- Management options for the renal mass refractory to ablative therapy include active surveillance, repeat ablation, and surgery.
- Best oncologic results for failed ablative therapy are achieved with surgical salvage, although patients should be counseled that the surgery may be difficult.

INTRODUCTION

For small renal masses less than 4 cm (cT1a), surgical extirpation that uses a nephron-sparing approach is the guideline-recommended therapy from both the American Urologic Association[1] and the European Association of Urology.[2] Recently, the indications for nephron-sparing surgery (NSS) for renal cancer have expanded to cT1b (4–7 cm) and even T2 (>7 cm) masses.[3] However, partial nephrectomy (PN) is associated with a heavy burden of risks, particularly for anatomically complex masses.[4] In such instances, focal ablative techniques offer patients, whose age or comorbidities pose an unacceptable risk for PN, a minimally invasive and nephron-sparing alternative to radical nephrectomy.[5] Other potential candidates for focal renal ablation are patients with small renal masses in the setting of hereditary kidney cancer syndromes who are predisposed to metachronous renal tumors, such as Birt-Hogg-Dube or von Hippel-Lindau. In addition, those patients with solitary renal units, those with chronic kidney disease, and those with bilateral renal tumors may be offered ablative therapy.

The focus of this article is to summarize the available literature describing the oncologic efficacy of thermal renal mass ablation when compared with standard PN, particularly for radiofrequency ablation (RFA), microwave ablation (MWA), and cryotherapy (CT). Subsequently, a discussion of treatment success and tumor recurrence following thermal ablation, both in terms of their definitions and incidence, is undertaken with special attention paid to the limited guidance available describing management options for renal masses refractory to focal therapy.

[a] Department of Urologic Oncology, Stephenson Cancer Center, University of Oklahoma, 800 Northeast 10th Street, Suite 4300, Oklahoma City, OK 73104, USA; [b] Department of Urology, Stephenson Cancer Center, The University of Oklahoma, 800 Northeast 10th Street, Suite 4300, Oklahoma City, OK 73104, USA
* Corresponding author.
E-mail address: Michael-Cookson@ouhsc.edu

Urol Clin N Am 44 (2017) 305–312
http://dx.doi.org/10.1016/j.ucl.2016.12.015

ONCOLOGIC EFFICACY: A COMPARISON OF FOCAL THERAPY WITH PARTIAL NEPHRECTOMY

There is no level-1 evidence in the literature examining any focal ablation modality against PN in head-to-head randomized analysis.[6] Therefore, interpretation of the available retrospective comparative studies must be approached with a degree of skepticism and caution. As Kutikov and colleagues[7] have pointed out, common pitfalls in the literature undermining the credibility of focal therapy as oncologically noninferior to extirpation include significant patient and tumor selection bias, a lack of matched cohort analyses, small sample sizes, and short-term follow-up. Because the scope of this summary is confined to comparative studies between focal therapy and NSS, single-armed investigational trials of ablative techniques have been omitted. However, Wagstaff and colleagues[5] assembled a comprehensive listing of all the known oncologic outcomes from focal ablation of renal masses as of 2014.

Partial Nephrectomy Versus Radiofrequency Ablation

In 2007, Stern and colleagues[8] published the first short-term comparative analysis of 77 patients with cT1a renal masses, 40 of who underwent RFA, whereas 37 underwent open or laparoscopic PN. At a median 3 years of follow-up, there was similar disease-free survival between the two groups (93.4% vs 95.8%, respectively, $P = .67$), with 2 patients in each cohort experiencing disease recurrence and no cause-specific mortality reported. In considering only patients with confirmed malignancy, the disease-free survival was more disparate for the RFA group (91.4% vs 95.2%); however, the difference failed to reach statistical significance ($P = .58$).

Five years later, Olweny and colleagues[9] published a similar cohort study, again in patients with cT1a renal masses undergoing RFA or PN, however, with at least 5 years' follow-up (n = 72, 37 in each arm). Overall survival (97.2% vs 100%), cancer-specific survival (97.2% vs 100%), and recurrence-free survival (91.7% vs 94.6%) all favored PN but by statistically insignificant margins.

RFA has also been compared against PN for larger (cT1b) masses.[10] Between 2006 and 2010, 56 patients underwent either focal RFA or NSS in China. Once again, RFA was noninferior to PN in terms of overall survival, cancer-specific survival, and disease-free survival; however, there was a trend toward significant for an overall survival advantage favoring PN (85.5% vs 96.6%, $P = .14$).

Data from the Mayo Clinic represent the dissenting contribution of outcomes on the subject of RFA (n = 180) versus PN (n = 1057). Reporting on 1803 patients with cT1a tumors over an 11-year period, Thompson and colleagues[11] revealed different overall survival results compared with their contemporaries (RFA: 82% vs PN: 95% in patients with cT1a disease at 3 years, $P<.001$). Although local recurrence-free survival rates were the same between RFA and PN (98% vs 98%), distant metastasis-free survival rates were significantly worse for the RFA cohort (93% vs 99%, $P = .005$). Although the investigators concluded that *local* recurrence-free survival was indeed similar for treatment of cT1a renal masses with RFA or PN, clearly this statement deserves further validation; any meaningful application of these findings in clinical practice is limited.

Partial Nephrectomy Versus Cryotherapy

Cohorts with renal masses less than 4 cm were also offered CT (n = 187) at the Mayo Clinic and once again compared with patients undergoing PN and RFA.[11,12] This subset of patients outperformed those who underwent RFA in metastasis-free survival (CT: 100% vs RFA: 93%) and overall survival (CT: 88% vs RFA: 82%). CT patients had the same 3-year local recurrence-free survival as those who underwent PN (98% for both cohorts).

Thompson and colleagues[11] also described 48 patients with cT1b renal masses treated with CT and compared them with 326 similar patients that underwent PN. At 3 years' follow-up, local recurrence-free survival (CT: 97% vs PN: 96%) and metastasis-free survival (CT: 92% vs PN: 96%) were similar between the two groups. However, it should be noted that significantly fewer patients in the CT arm had pathologically proven malignancy than in the PN group (CT: 68% vs PN 84%, $P = .004$). Significantly more patients in the CT arm were likely to die of any cause within 3 years after intervention than in the PN arm (overall survival CT: 74% vs PN: 93%), which likely reflects the older age ($P < .001$) and higher Charlson Comorbidity Index ($P < .001$) of patients selected to undergo CT at the Mayo Clinic.

Lastly, 2 studies have been performed comparing laparoscopic versus percutaneous CT techniques.[13,14] Both conclude that either modality for CT offers similar oncologic control on par with recurrence-free/cancer-specific/overall survival rates reported by predecessors; however, Goyal and colleagues[13] also concluded that a potential advantage to percutaneous CT exists regarding duration of hospital stay (percutaneous: 0.7 days vs laparoscopic: 3.2 days, $P<.0001$).