

Surgical Salvage of Thermal Ablation Failures for Renal Cell Carcinoma

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Abbreviations and Acronyms

AUA = American Urological Association

CA = cryoablation

CKD = chronic kidney disease

EBL = estimated blood loss

GFR = glomerular filtration rate

LOS = length of stay

PN = partial nephrectomy

RCC = renal cell carcinoma

R.E.N.A.L. = (R)adius (tumor size as maximal diameter), (E)xophytic/endophytic properties of tumor, (N)earness of tumor deepest portion to collecting system or sinus, (A)nterior (a)/ posterior (p) descriptor and (L)ocation relative to polar line

RFA = radio frequency ablation

RN = radical nephrectomy

TA = thermal ablation

Purpose: Cryoablation and radio frequency ablation are attractive modalities for small renal masses in patients with substantial comorbidities. However, salvage extirpative therapy for local recurrence after thermal ablation can be challenging due to associated perinephric fibrosis.

Materials and Methods: Patients with thermal ablation refractory tumors requiring surgical salvage from 1997 to 2013 were identified and retrospectively reviewed.

Results: A total of 27 patients were treated surgically after cryoablation (18) or radio frequency ablation (9) failed. Subjective assessment indicated moderate/severe fibrosis in 22 cases (81%). Partial nephrectomy was preferred in all patients but was not possible in 12, primarily due to unfavorable tumor size/location. In the intended partial nephrectomy group (15) open surgery was performed in all patients and completed in 14, with the procedure aborted in 1 due to extensive perinephric fibrosis. Radical nephrectomy was planned in 12 patients, of whom 8 were treated laparoscopically with 1 requiring conversion to open. Median estimated blood loss was 225 ml. Overall 17 patients experienced no complications and 4 had minor complications. However, 6 patients experienced more significant complications (Clavien III-IVb). Since January 2008 partial nephrectomy was performed more frequently (12 of 17, or 71% vs 2 of 10, or 20% for previous cases, $p=0.02$).

Conclusions: Surgical salvage after failed thermal ablation is feasible in most instances, and partial nephrectomy is often possible but can be challenging due to associated perinephric fibrosis. The difficulty of surgical salvage should be recognized as a potential limitation of the thermal ablation treatment strategy. Prospective studies of thermal ablation vs partial nephrectomy should be prioritized to provide higher quality data about the merits and limitations of each approach.

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For another article on a related topic see page 756.

Editor's Note: This article is the second of 5 published in this issue for which category 1 CME credits can be earned. Instructions for obtaining credits are given with the questions on pages 810 and 811.

Key Words: carcinoma, renal cell; cryosurgery; ablation techniques; neoplasm recurrence, local; nephrectomy

ACCORDING to the 2009 AUA guidelines the reference standard for the treatment of T1a RCC is partial nephrectomy, which has oncologic outcomes similar to those of RN for small renal masses while preserving more renal function.¹ Thermal ablation, including cryoablation or radio frequency ablation, is an appealing alternate nephron sparing strategy for T1a renal masses in patients with multiple medical comorbidities or advanced age.¹⁻³ Analysis of the SEER (Surveillance, Epidemiology, and End Results) database revealed that patients treated with TA were more likely to be older and have smaller diameter tumors.⁴ Other potential advantages of TA include its minimally invasive nature, reduced perioperative complications, and shorter hospitalization and convalescence periods.²⁻⁶ An inherent disadvantage of TA is that the tumor remains in situ, leading to uncertainty about post-ablative imaging and surveillance.^{1,7-10}

However, long-term followup for TA modalities remains limited and questions persist regarding incomplete tumor eradication.^{2,3,9,10} The AUA guidelines analysis concluded that TA may provide suboptimal local tumor control,¹ as have subsequent analyses. For instance, in the meta-analysis by Klatte et al CA was associated with better perioperative outcomes and fewer complications, but exhibited a 9.4-fold increased risk of local tumor progression and a 4.7-fold increased risk of metastasis compared with PN.¹¹ On the other hand, other studies provide more encouraging results, such as the analysis by Tracy et al, who demonstrated a durable 5-year recurrence-free survival rate of 90% for small renal masses treated with RFA.⁶

Local recurrence after TA failure is frequently managed by repeat TA but some patients are not candidates for repeat ablation due to tumor progression or numerous prior attempts at TA. However, surgical salvage after failed ablation can be complicated by perinephric fibrosis, as demonstrated by our preliminary experience and analogous studies from other centers.¹²⁻¹⁵ In this more mature experience we present the outcomes, feasibility and potential morbidity of the largest series to date, to our knowledge, of post-TA surgical salvage.

MATERIALS AND METHODS

We retrospectively searched our database to identify patients who underwent surgical salvage for an ipsilateral renal mass recurrence after prior TA at the Cleveland Clinic and Case Western Reserve Medical Center (September 1997 to December 2013). Patients were initially treated with TA at our centers or were referred after TA

failure elsewhere. TA failure was defined as recurrent or new radiographic enhancement of tumors on contrast imaging studies, biopsy proven cancer recurrence or the development of progressive disease on imaging studies. Patients with familial syndromes were excluded from analysis. Indications for salvage surgery included recurrent TA failure (ie salvage TA failed), tumors not amenable to repeat TA due to diameter greater than 3.0 cm, hilar location or proximity to bowel/pancreas, or new ipsilateral tumor formation with similar characteristics. R.E.N.A.L. score for complexity of PN was defined as previously described.¹⁶

To assess outcomes after surgical salvage, clinical and operative reports were reviewed. End points such as LOS, EBL, surgical complications¹⁷ and oncologic outcomes were evaluated to assess the safety, feasibility and technical difficulty of salvage surgery after prior TA procedures. The degree of fibrosis was recorded from subjective surgeon perspective based on operative reports. Patient followup regarding change in GFR or oncologic status was determined by last office visit, radiologic study, laboratory testing or written correspondence.

The degree of fibrosis and rate of complications between CA and RFA as well as the early vs late PN experience were compared using Fisher's exact test. Statistical analysis was performed using GraphPad Prism® version 5.04 for Windows. All statistical tests were 2-sided with significance defined as $p < 0.05$.

RESULTS

A total of 27 patients with TA failure were identified who required surgical salvage, including 18 after CA and 9 after RFA. Median patient age at first TA treatment was 64 years, and median interval between TA and salvage surgery was 13 months (table 1). The indications for surgical salvage included recurrent TA failure (26%), tumors not amenable to repeat TA due to diameter greater than 3.0 cm, hilar location or proximity to bowel/pancreas (67%), or new ipsilateral tumor formation not amenable to TA (7%). The figure illustrates representative patients with local recurrence requiring surgical salvage. Median tumor diameter was 3.6 cm and 4 patients had multiple tumors excised at the time of surgery. At extirpative surgery 24 patients had clinically confined disease while 3 presented with renal vein thrombi. Of the latter group 1 patient also exhibited lymphadenopathy on preoperative imaging and final pathology demonstrated metastases in 2 of 6 lymph nodes. Final stage based on the salvage specimen was pT3a in 8 and 11 tumors were high grade.

Nephron sparing surgery was preferred whenever oncologically and surgically feasible based on

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