Long-term Outcomes in Image-Guided Radiofrequency, Microwave, and Cryoablation of Small Renal Masses: A Retrospective Tertiary Care Experience

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Background

- Traditionally, partial nephrectomy was employed as the standard of treatment for small renal masses (< 4.0 cm) [1].
- However, recently invented minimally invasive techniques involving image-guided percutaneous thermal ablation (i.e., radiofrequency (RF) ablation, cryoablation, and microwave (MW) ablation) have also been demonstrated to be safe and effective treatment options for small to medium sized solid renal masses [2, 3].
- Although the use of these thermal ablation techniques has increased over the years and their individual efficacy has been demonstrated in the short term, there are limited studies examining their long-term clinical outcomes [4].

Purpose

- To examine a 5-year institutional experience of clinical outcomes for percutaneous image-guided ablation for small renal neoplasms utilizing radiofrequency ablation, cryoablation, or microwave ablation at a tertiary academic medical center.

Methods

- Between January 2015 and January 2020, 48 consecutive patients underwent image-guided thermal ablation techniques (microwave (MW), radiofrequency (RF), and cryoablation) at a tertiary academic medical center.
- Patient demographics and mass characteristics were categorized.
- Outcome variables included technical success rates, radiographic response rates, overall survival (OS) from all-cause mortality and progression free survival (PFS). Furthermore, pre- and post-ablation glomerular filtration rates (GFR), creatinine, and hemoglobin were examined.

Results

Number of Patients	**48**	
Age (yrs)	65.5	± 13
Gender		
Male	30	62.5%
Female	18	37.5%
Race		
Caucasian	41	85.4%
Black	7	14.6%
Diagnosis		
Clear Cell	27	56.3%
Clear cell papillary	3	6.3%
Chromophobe	2	4.2%
Oncocytoma	8	16.7%
Papillary	8	16.7%
Grade (reported for 30)		
'1	2	6.7%
'2	22	73.3%
'3	5	16.7%
'4	1	3.3%
TNM Staging		
T1a	35	76.1%
T1b	9	19.6%

Table 1: Patient demographics and mass characteristics

Number of Treatments	48	
Treatment Location		
Right	21	43.8%
Upper	10	47.6%
Inter	7	33.3%
Lower	4	19.0%
Left	27	56.3%
Upper	8	29.6%
Inter	6	22.2%
Lower	13	48.1%
Ablation Type		
Cryo	15	31.3%
Microwave	30	62.5%
RF	3	6.3%
Guidance Used		
CT	48	100.0%
US	48	100.0%
Contrast Enhanced US	2	4.2%
Hydro-dissection	13	27.1%
Serology (Pre/Post)		
Creatinine	1.31/1.49	0.18 *(p > 0.05)*
Hemoglobin	13.3/12.6	-0.7 *(p > 0.05)*
GFR	82.3/79.2	2.1 *(p > 0.05)*

Table 2: Treatment characteristics and laboratory variable outcomes. ***Cryo:*** *cryoablation*, ***RF:*** *Radiofrequency ablation*

Results cont.

Clinical Outcomes	Value	SD/Percent
Radiographic Response		
1-Month		
Complete Response	47	97.9%
Partial Response	1	2.1%
Stable Disease	0	0.0%
Progressive Disease	0	0.0%
3-Month		
Complete Response	47	97.9%
Partial Response	1	3.0%
Stable Disease	0	0.0%
Progressive Disease	0	0.0%
6-Month*		
Complete Response	30	100.0%
Partial Response	0	0.0%
Stable Disease	0	0.0%
Progressive Disease	0	0.0%
PFS	35.1	± 21.0
Survival		
30-day	48	100.0%
1-Year	45	93.8%
3-Year	43	89.6%
5-Year	42	87.5%
Overall Survival to date	42	87.5%

Table 3: Clinical outcomes. *Only 30/48 patients had 6 months of follow-up, *PFS: Progression Free Survival*.

Conclusion

- Percutaneous ablation therapies are safe and effective curative-intent modalities for treatment of small renal masses, with promising long-term outcomes.

References

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