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# Contemporary management of small renal masses: does practice environment matter?

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**Introduction:** Population based studies imply underutilization of renal preservation for managing small renal mass (SRMs). Limited information is available regarding the impact of practice environment on SRM treatment. We evaluated practice patterns for SRMs in the context of a urologist's practice environment.

**Materials and methods:** Survey instrument querying practice type (private versus academic/academic affiliation) was distributed to urologists of the Mid-Atlantic section of the American Urological Association. Physicians were presented three case scenarios (exophytic 2.5 cm SRM in a healthy 55-year-old, healthy 75-year-old, and comorbid 75-year-old patient) and were queried on management.

**Results:** Of the 281 respondents who manage kidney cancer, 92 practiced in an academic environment, and 189 were private practitioners. Thirty-four percent had completed residency training within 10 years, 25% between 11-20 years, and 41% over 20 years. For SRMs in a healthy 55-year-old, over 95% of practicing nephrologists advocated nephron-sparing treatments. Nonetheless,

private practitioners were more likely to perform a radical nephrectomy (6% versus 0%,  $p = 0.03$ ) and less likely to perform a partial nephrectomy (79% versus 91%,  $p = 0.01$ ) than academic counterparts. We observed an increase in the percentage of urologists offering thermal ablation (38% versus 12%,  $p < 0.0001$ ) and observation (29% versus 1%,  $p < 0.0001$ ) with a corresponding decline in the use of partial nephrectomy (32% versus 83%,  $p < 0.0001$ ) in the 75-year-old versus 55-year-old patient. When considering management of a SRM in 75-year-old patients (healthy or comorbid), private practitioners were more likely to offer a thermal ablative procedure when compared to academic urologists (41% versus 32%,  $p = 0.05$ ).

**Conclusions:** Over 95% of urologists espouse renal preservation strategies for a SRM in a healthy, young patient. Private practitioners are more likely to perform a radical (and less likely a partial) nephrectomy in this cohort. While surveillance is increasingly utilized for SRMs in the elderly patient, private practitioners are more likely to recommend active treatment via thermal ablation when compared to academic counterparts.

**Key Words:** practice environment, renal mass, partial nephrectomy, active surveillance, thermal ablation

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## Introduction

In 2012, almost 65,000 new cases of kidney and renal pelvic cancers were reported in the United States.<sup>1</sup> A greater use of abdominal cross sectional imaging (CT or MRI) has contributed to characterizing many of these newly diagnosed renal lesions as small renal masses (SRMs).<sup>2,3</sup> Although many SRMs are pathologically renal cell carcinoma (RCC), these tumors are typically of lower stage and grade and portend a more favorable prognosis.<sup>4</sup> While radical nephrectomy (RN) has historically been used to manage all renal malignancies, equivalent oncologic and superior renal function

outcomes has contributed to partial nephrectomy becoming the new standard of care for treating SRMs.<sup>5,6</sup> Nephron-sparing surgery (NSS), however, is not without associated perioperative complications and patient morbidity.<sup>7</sup> Efforts to reduce the morbidity from extirpative surgery have driven utilization of more conservative treatment modalities for SRMs, such as laparoscopic or percutaneous thermal ablation (cryoablation or radiofrequency ablation [RFA]) or active surveillance. In properly selected patients, these strategies also appear to be safe and effective.<sup>8-10</sup>

Several population based studies have continued to implicate that partial nephrectomy is underutilized in the treatment of cT1a ( $\leq 4$  cm) renal tumors.<sup>11-15</sup> To better explore the issue of surgeon factors impacting utilization of renal preserving techniques for SRMs, we queried practicing physicians members of the American Urological Association (AUA) as to their specific practice patterns. We hypothesized that practice environment

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(academic versus private practice) may contribute differences in treatment strategy based upon factors including (but not limited to) potential for complications, availability of ancillary staff, amount of time in operating room, and individual surgical volume status.

## Materials and methods

In January 2009, a survey was mailed to the address of all attending physician urologists in the Mid-Atlantic Section of the American Urological Association (MA-AUA) listed in the AUA access directory. A postmarked envelope was included with each survey, and no compensation was offered for participants. A total of 896 surveys were mailed with completed surveys collected over a period of 12 weeks following distribution.

Urologists were queried on whether he/she treats kidney cancer, percentage of practice comprised of kidney cancer, practice environment (private versus academic/academic affiliation), and time since completion of residency. Additionally, responding urologists were presented with three case scenarios regarding management of SRMs. All three patients were presented with the diagnosis a 2.5 cm incidental enhancing left renal mass that was partially exophytic in nature and located on the lateral aspect of the kidney. The differentiating factor in the three case scenarios was patient age and health status. Specifically, patients were described as follows: 1) a healthy 55-year-old male with normal renal function; 2) a healthy 75-year-old male with normal renal function; and 3) a 75-year-old male with hypertension, diabetes, coronary artery disease albeit with normal renal function. Available treatment options presented to the respondents included nephrectomy (open/laparoscopic), partial

nephrectomy (open/laparoscopic), thermal ablation (RFA/cryoablation via laparoscopic or percutaneous approaches), or observation with serial imaging.

Descriptive statistics were performed using software from the survey company. The chi-square test evaluated the association between practice environment and volume of kidney cancer and years in practice. Additionally, univariate associations between practice type and management of different SRM case scenarios were determined. Logistic regression methodology was used to specifically determine independent variables associated with partial versus radical nephrectomy. Statistical analysis was performed with S-Plus Professional (MathSoft Inc., Seattle, WA, USA).

## Results

Of the 896 surveys mailed to MA-AUA attending urologists, there were 301 responses for a response rate of 34%. Amongst this cohort of 301 urologists, 281 indicated that they actively managed kidney cancer in the adult population and this group formed our study population. Within this group, 92 (33%) urologists practiced at an academic medical center or in a practice with an academic affiliation, while 189 (67%) identified themselves as private practitioners. Overall, 85% of urologists indicated that kidney cancer comprised < 20% of their practice. However, as expected a greater percentage of academic urologists identified themselves as high volume kidney cancer surgeons when compared to private practitioners,  $p < 0.001$ , Table 1. Of the 27 academic urologists with > 20% kidney cancer practices, 13 (44%) were within 0-5 years of training, 10 (37%) were within 6-10 years of training, and the remaining trained at later time

TABLE 1. Summary of physician baseline characteristics stratified by academic versus private practice environment

Variable	Practice environment		p value
% of practice comprised of kidney cancer	Academic No. (%)	Private No. (%)	
≤ 20%	65 (71)	175 (93)	$p < 0.001$
21%-40%	22 (24)	8 (4)	
> 40%	5 (5)	6 (3)	
Total	92 (100)	189 (100)	
Years since residency			
≤ 5	20 (22)	27 (14)	$p = 0.13$
6-10	16 (17)	34 (18)	
11-20	20 (22)	51 (27)	
> 20	36 (39)	77 (41)	
Total	92 (100)	189 (100)	

TABLE 2. Responses to case scenarios of patients with small renal masses

Treatment	55-year-old healthy		75-year-old healthy		75-year-old comorbidities	
	No. (%)		No. (%)		No. (%)	
	Academic	Private	Academic	Private	Academic	Private
Radical nephrectomy <sup>1</sup>	0 (0)	12 (6)	2 (2)	7 (4)	0 (0)	0 (0)
Partial nephrectomy <sup>1</sup>	84 (91)	149 (79)	47 (51)	87 (46)	15 (16)	29 (15)
Thermal ablation <sup>2</sup>	7 (8)	26 (14)	29 (32)	73 (39)	30 (33)	82 (43)
Observation	1 (1)	2 (1)	14 (15)	22 (12)	47 (51)	78 (41)
Total	92 (100)	189 (100)	92 (100)	189 (100)	92 (100)	189 (100)

<sup>1</sup>Open or laparoscopic<sup>2</sup>Laparoscopic or percutaneous; cryoablation or radiofrequency ablation

intervals. For the 14 private practice urologists, with > 20% kidney cancer practices, 3 (22%) were within 0-5 years of training, and 11 (78%) trained between 6-10 years. Within our group, 34% had completed residency training within the past 10 years, 25% had been in practice 11-20 years, and 41% over 20 years. There was, however, no difference in level of experience when comparing those of an academic versus private practice background.

Responses to the case scenarios are shown in Table 2. Overall, over 95% of urologists espouse renal preservation strategies for a SRM in a healthy, young patient. In particular, for the index 55-year-old healthy male patient with a 2.5 cm partially exophytic left renal mass, partial nephrectomy via any approach was recommended by 83% (233 of 281) of respondents. We observed, however, that private practice urologists were less likely to offer a partial nephrectomy than those in an academic environment (79% versus 91%,  $p = 0.01$ ). Along these same lines, private practice urologists were also more likely to perform a radical nephrectomy when compared to academic urology counterparts (6% versus 0%,  $p = 0.03$ ) for this same lesion. No differences in utilization of thermal ablation or active surveillance were noted in this proposed scenario. In a multivariate model controlling for years in practice and percentage of practice comprised of kidney cancer, we observed that private practice environment (OR 1.43, 95% CI 1.08-1.93,  $p = 0.04$ ) and percentage of practice of kidney cancer < 20% (OR 1.98, 95% CI 1.53-2.67,  $p = 0.01$ ) were associated with selection of radical nephrectomy versus partial nephrectomy.

In considering this same lesion in a healthy 75-year-old male, partial nephrectomy remained the most popular choice (48% of all responders) followed by thermal ablation (36%) and observation (13%). When compared to management strategies for the 55-year-old patient, we noted an increase in the percentage of

urologists offering thermal ablation (36% versus 12%,  $p < 0.0001$ ) and observation (13% versus 1%,  $p < 0.001$ ) with a corresponding decline in use of partial nephrectomy (48% versus 83%,  $p < 0.0001$ ). Overall, renal preservation was well appreciated in this cohort with only 3% of all urologists electing for a radical nephrectomy. Finally, we did not appreciate any difference in the choice of treatment modality stratified by practice environment with regards to this index patient.

For the 75-year-old comorbid patient, both observation (44%) and thermal ablation (40%) were readily recommended by responding urologists, although 16% (44 of 281) still advocated partial nephrectomy despite coexistent medical problems. As expected, when compared to strategies for a healthy 75-year-old patient, we noted an increasing percentage of urologists who recommended observation (44% versus 13%,  $p < 0.0001$ ) in this patient population. Once again, no significant difference in practice pattern was detected between academic and private practice urologists for this third presented scenario. Finally, when considering management of a SRM in our 75-year-old patients (healthy or comorbid), we noted that private practitioners were more likely to offer a thermal ablative procedure when compared to academic urologists (41% versus 32%,  $p = 0.05$ ).

## Discussion

Population based studies have implicated an increased diagnosis of SRMs with a corresponding rise in renal surgery cases likely for management of these lesions.<sup>16</sup> Presumably due to this increase in SRMs, the AUA published guidelines in 2009 for management of these index lesions.<sup>17</sup> These guidelines emphasize the importance of renal preservation in the form of partial nephrectomy for healthy patients with clinical T1a

tumors. Recent series highlighting the increased rates of chronic renal insufficiency and overall mortality in patients following radical nephrectomy further emphasize that preservation of functional renal tissue is a crucial consideration when managing renal tumors.<sup>18,19</sup>

It appears that a greater percentage of SRMs are being managed by partial nephrectomy. Porter and Lin recently reviewed the National Inpatient Sample database between 1998 and 2002 and reported on the frequency of partial and radical nephrectomy during these years, as well as factors associated with partial nephrectomy.<sup>12</sup> These authors found that the proportion of partial nephrectomies increased from 7.9% in 1998 to 15.5% in 2002. Additionally, this group noted that partial nephrectomy usage was associated with several variables including male gender, patient age, hospital teaching status, hospital and surgeon volume, and insurance status. Similarly, Baillargeon-Gagne et al published on trends in the use of partial nephrectomy as reported in the Surveillance, Epidemiology and End Results (SEER) database.<sup>15</sup> These authors observed an increase in partial nephrectomy utilization from 5.3% (between 1989-1993) to 23.0% (between 2002-2004) when considering all tumor sizes. Moreover, an absolute increase of 46.2% was noted in partial nephrectomy surgeries when managing renal masses  $\leq 4$  cm in diameter. Interestingly, this group also noted that certain variables such as geographic location were associated with partial versus radical nephrectomy. Similar work by Miller and colleagues using both the Nationwide Inpatient Sample<sup>13</sup> and Medicare linked SEER database<sup>14</sup> have implicated that hospital environment and surgeon practice style may preferentially determine the surgical approach for renal masses more than patient or disease characteristics.

In this survey study, we queried the practice pattern of almost 300 urologists in the MA-AUA section. While the majority of urologists advocate kidney sparing management of SRMs, we found that a relatively healthy patient with a small exophytic renal mass was more likely to undergo radical nephrectomy (6% versus 0%,  $p = 0.03$ ) and less likely to undergo a partial nephrectomy (79% versus 91%,  $p = 0.01$ ) when managed by a private practice versus academic urologist. We further noted that the practice patterns for all urologists evolved towards conservative therapies as the scenarios presented older and increasingly comorbid patients. Accepting the limitations of a survey-based study, our observations underscore a few important points.

Firstly, while partial nephrectomy was largely espoused by all urologists for younger patients with SRMs, practice environment appeared to impact the selection of partial versus radical nephrectomy. A salient

consideration is whether such observed differences present clinically meaningful (in addition to statistically significant) differences. Clearly, a larger sample size is necessary to better delineate such differences. Of note, we intentionally grouped surgical approach (minimally invasive versus open) together for each proposed therapy to avoid confounding issues in interpreting practice pattern based upon treatment modality. While our study failed to note differences when stratifying by surgical approach (data not shown), we acknowledge that Abouassaly et al have suggested that the introduction of laparoscopy in renal surgery has negatively impacted use of partial nephrectomy.<sup>20</sup>

Secondly, we observed that 32% of urologists would recommend a partial nephrectomy in a 75-year-old patient with a SRM. Population-based studies highlight that a greater percentage of SRMs are being diagnosed in the elderly population many of whom will be higher-risk surgical candidates.<sup>21</sup> As such, less invasive alternatives to radical or partial nephrectomy, such as percutaneous thermal ablation or observation with serial imaging, may be more optimally suited for managing SRMs in elderly patients. These latter observations are particularly notable when considering competing causes of mortality in this patient population. In particular, Hollingsworth and colleagues noted in a population based study that the estimated 5 year competing-cause mortality for patients  $\geq 70$  years of age was 28.2%.<sup>22</sup> This was greater than the estimated 5% cancer-specific mortality for renal tumors  $\leq 4$  cm in this same patient population suggesting surgery (or any intervention) may represent overtreatment for these SRMs.

Finally, for our scenario of SRMs presenting in a 75-year-old patient, we noted that private practitioners were more likely to offer thermal ablation with a trend towards less utilization of active surveillance regimens. While long term outcomes data are lacking for thermal ablation, short and intermediate term functional and oncologic outcomes are quite promising.<sup>9,10</sup> Nonetheless, several large series have highlighted that surveillance with serial imaging is a very reasonable alternative for such a patient cohort with a low incidence of progression to metastasis or cancer-specific death.<sup>23</sup> It is unclear whether these differences in this study are due to financial considerations, patient selection, or simply a function of a smaller sample size.

We would like to acknowledge some limitations within this study. Firstly, our response rate was only 34% and therefore may have disproportionately included urologists with a bias to completing this survey or a particular interest in kidney cancer management. Furthermore, the survey nature of this study may



contribute in part to the discrepancy observed between the relatively low percentage of patients treated with partial nephrectomy nationally<sup>24</sup> and what providers indicated they would select in this study. Secondly, this survey only evaluated practice patterns of one sub-section of the AUA and different patterns may be observed in other geographic regions or at a national level. In fact, Breau and colleagues explored this issue in a larger survey study of urologists in the country.<sup>25</sup> Despite limitations from low response rate (~5%) and disproportionately high percentage of academic urologists (> 40%), the study did highlight treatment heterogeneity for T1a renal tumors related to tumor, patient, and urologist factors. Finally, the survey did not permit respondents to further extrapolate on responses beyond selecting a multiple choice answer. As such, the exact reasons why private practice urologists are less likely to perform a partial nephrectomy in a younger patient or are more likely to utilize thermal ablation in an older patient are unknown and subject to hypothesis. Given observed differences in this study, future studies are best suited to explore such issues to better understand how to create uniformity in proposed therapies.

## Conclusion

This survey based study evaluated the practice patterns of private and academic urologist practitioners regarding treatments of SRMs when presented several patient scenarios. Our study confirms an overall dissemination within the urologic community of the importance of preservation of functional renal parenchyma in the treatment of SRMs with a relatively small percentage of practitioners (< 5%) selecting radical nephrectomy for therapy. Nonetheless, we found that private practitioners were more likely to recommend radical nephrectomy and less likely recommend a partial nephrectomy for a young, healthy patient with an incidentally detected SRM. Future studies are requisite to better delineate the etiology behind these observations. □

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