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ORIGINAL ARTICLE

The impact of gender and size on the pathology of small renal mass

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Abstract Without surgery, it is hard to predict the histology of small (≦ 4 cm) renal masses (SRMs) based on images. This study attempted to investigate whether clinical parameters were correlated with the pathological presence of SRM carcinomas. We conducted a retrospective chart review of 60 patients with 61 suspicious SRMs on radiological examination who received radical nephrectomy (RN) or partial nephrectomy (PN) between January 2003 and February 2011 in the China Medical University Hospital (CMUH). The correlations between patient age, gender, tumor size, and pathological features were calculated and analyzed. Of the 61 SRMs, there were 51 (83.6%) renal cell carcinoma (RCC), seven (11.5%) angiomyolipoma, two (3.3%) oncocytoma, and one (1.6%) metanephric adenoma. Regarding the histological variants of these cases of RCC, 44 were categorized as the clear cell type, two as the papillary type, and five as the chromophobe type. The incidence of benign tumor was greater in females ($p = 0.014$) and tumor size 2 cm or less ($p = 0.02$), compared with males and tumor size more than 2 cm, respectively. Surgical intervention is generally recommended for medically fit patients.

Introduction

The detection of small renal mass (SRM) has increased greatly given the widespread use of diagnostic imaging modalities including sonography, computed tomography (CT), and magnetic resonance imaging (MRI). Of SRM cases, approximately 80% were malignant and 20% were benign

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[1–7]. However, there were no specific imaging findings that conclusively identified a mass as malignant or benign [8,9]. Until recently, several studies with small sample sizes have demonstrated the differentiation between oncocytoma and renal cell carcinoma (RCC) based on multiphase CT [10,11]. Owing to the lack of precise diagnosis by non-invasive measures, various treatment options such as active surveillance, needle biopsy, tumor ablation, and nephrectomy have been proposed. The choice of treatment strategy depends on patients' age, renal function, and comorbidities [9].

As the literature is limited concerning SRM in Taiwan [12], this study was conducted to investigate the pathology of SRMs with suspicion of malignancy and assess relevant clinical parameters.

Materials and methods

We retrospectively reviewed the medical records of patients receiving partial nephrectomy (PN) or radical nephrectomy (RN) between January 2003 and February 2011 in the China Medical University Hospital (CMUH). There were 60 patients with 61 renal masses with a size of 4 cm or less. All the renal masses were localized, sporadic, solid, and enhanced on CT or MRI. Owing to a suspicion of malignancy, the renal masses were surgically resected. In addition to the imperative indications such as bilateral renal masses, atrophic opposite kidney, and compromised renal function, PN was also performed electively in patients with normal opposite kidney. However, RN was reserved for renal masses located in the renal hilum or with central sinus invasion. No biopsy or ablation was done preoperatively. After the operation, the pathological features were reviewed by experienced pathologists.

Clinicopathological features among different surgical strategies and tumor histology were compared using the Student *t* test and Fisher's exact test. Statistical analyses were performed using the Statistical Product and Service Solution (SPSS, version 17.0, SPSS Inc., Chicago, Illinois, USA), and a $p < 0.05$ was considered statistically significant. The protocol of this study was approved by the Ethic Committee of CMUH.

Results

Among the 61 SRM cases, the mean age at surgery was 57.7 years (range 26–86 years). The mean tumor size was 3.0 cm (range 1.5–4 cm). Thirty-five patients (57.4%) were male and twenty-six (42.6%) were female. One female patient received bilateral PN for bilateral SRM. Table 1 lists the demographics and pathological features of all SRM cases, stratified by surgical modalities. PN and RN were performed for 51 and 10 SRM cases, respectively. There was no significant difference in age at surgery, tumor size, and gender between patients receiving PN or RN. Of the 61 SRM, there were 51 RCC, seven angiomyolipoma (AML), two oncocytoma, and one metanephric adenoma. Regarding the histological variants of the cases of RCC, 44 were categorized as the clear cell type, two as the papillary type, and five as the chromophobe type. One patient in our study cohort was an Italian whose SRM was oncocytoma.

Table 1 Demographics and pathological features of small renal mass (SRM) cases.

	Partial nephrectomy	Radical nephrectomy	*p*
No. of SRMs	51	10	
Mean age at surgery (range)	57.8 (34–83)	57.1 (26–86)	0.891
Mean cm tumor size (range)	2.9 (1.5–4)	3.1 (2.2–4)	0.409
No. of gender (%)			
Females	21 (41.2)	5 (50.0)	0.731
Males	30 (58.8)	5 (50.0)	
No. of histological subtype (%)			
Clear cell RCC	36 (70.6)	8 (80.0)	
Papillary RCC	1 (2.0)	1 (10.0)	
Chromophobe RCC	4 (7.8)	1 (10.0)	
AML	7 (13.7)	0	
Oncocytoma	2 (3.9)	0	
Metanephric adenoma	1 (2.0)	0	

AML = angiomyolipoma; RCC = renal cell carcinoma; SRM = small renal mass.

Table 2 shows the comparison of clinical parameters between benign tumors and RCC. Of the 26 females, eight (30.8%) had benign tumors compared with two of the 35 males (5.7%; $p = 0.014$). The mean diameter of benign tumor was smaller than that of RCC (2.4 cm versus 3.1 cm, $p = 0.012$). Age at surgery and modality of surgery were not significantly correlated with the incidence of RCC among SRM cases. To further clarify the influence of size and gender on tumor histology, we adopted 2 cm as a cutoff value (Table 3) and found that benign tumor was more common in the SRM with a size of 2 cm or less (50.0% versus 11.3%, $p = 0.02$). In addition, for SRM with a size of 2 cm or less, the incidence of benign histology remained greater in females than in males (75% versus 25% respectively, Table 3), although the case numbers were too small to reach statistical significance.

Table 2 Comparison of clinical parameters between benign tumors and renal cell carcinoma (RCC).

	Benign tumor	RCC	*p*
No. of SRMs (%)	10 (16.4)	51 (83.6)	
Mean age at surgery (range)	53.8 (39–74)	58.4 (26–86)	0.354
Mean cm tumor size (range)	2.4 (1.5–3.5)	3.1 (1.5–4)	0.012*
No. of gender (%)			
Females	8 (80.0)	18 (35.3)	0.014*
Males	2 (20.0)	33 (64.7)	
No. of nephrectomy (%)			
PN	10 (100)	41 (80.4)	0.191
RN	0 (0)	10 (19.6)	

PN = partial nephrectomy; RCC = renal cell carcinoma; RN = radical nephrectomy; SRM = small renal mass.
* $p < 0.05$.