Correlation Between Size of Renal Cell Carcinoma and Its Grade, Stage, and Histological Subtype

Ali Tabibi,[1] Mahmoud Parvin,[2] Hamidreza Abdi,[1] Reza Bashtar,[1] Nasim Zamani,[3] Behrang Abadpour[1]

Introduction: The aim of this study was to determine the correlation between histological subtype, size, grade, and stage of the kidney tumors and to investigate whether a correlation exists between the size of the kidney tumor and its behavior.

Materials and Methods: Between 1996 and 2004, we had 212 patients with radical or partial nephrectomy due to a kidney tumor at Shaheed Labbafinejad Medical Center. Their pathologic blocks were re-evaluated with consideration of their tumor size and pathologic features.

Results: Of 212 pathologic blocks, 17 (8%) were benign and 195 (92%) were malignant masses including 179 renal cell carcinoma (RCC) tumors. Malignant tumors were slightly greater compared with the benign ones ($P = .10$). There was no significant relation between the size of tumor and the histological subtype. Significant relations between the size of the kidney tumor and the nuclear grade ($P = .007$), clinical symptoms ($P = .02$), and extracapsular extension ($P < .001$) were observed. In smaller RCC tumors (< 4 cm), extracapsular extension (stages T3 and T4) was rare (1 in 29). However, smaller RCC tumors were not significantly different from those larger than 4 cm regarding the nuclear grade, symptoms, and histological subtypes.

Conclusions: Tumor size is not an independent predictor for the histological subtype of the tumors; however, larger malignant tumors may have higher grades, higher stages, and clinical symptoms.

Keywords: kidney neoplasms, tumor size, pathologic grade, stage, renal cell carcinoma

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[1]Department of Urology, Shaheed Labbafinejad Hospital, Shaheed Beheshti University of Medical Sciences, Tehran, Iran
[2]Department of Pathology, Shaheed Labbafinejad Hospital, Shaheed Beheshti University of Medical Sciences, Tehran, Iran
[3]Urology and Nephrology Research Center, Shaheed Beheshti University of Medical Sciences, Tehran, Iran

Corresponding Author:
Hamidreza Abdi, MD
Department of Urology, Shaheed Labbafinejad Medical Center, Pasdaran, Tehran, Iran
Tel: +98 21 258 8016
E-mail: hamidreza-abdi@hotmail.com

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INTRODUCTION

With the advent of the new imaging technologies, more cases of kidney neoplams are diagnosed at earlier stages.[1-3] Since biopsy is not routinely performed for the diagnosis and evaluation of the kidney tumors, size of the tumor and radiographic features can be important in surgeon's decision making.[4] Renal cell carcinoma (RCC) tumors tend to be spherical and their radiologic and pathologic measurement is easy.[5] Although the association between pathologic tumor size and the outcome of the RCC is well understood, evidence about the relationship between the pathologic tumor size and other features is lacking. Reviewing the literature, there is only one paper that studies the relationship between the size of the kidney tumor and histological features in a large number of patients.[4] Therefore, we designed a study to investigate the relationship between the size of the kidney tumor and its histological subtype and pathologic stage and grade in our hospital.

MATERIALS AND METHODS

Between 1996 and 2004, a total of 212 patients with clinical diagnosis of kidney neoplasm underwent radical or partial nephrectomy at our center. Physical examination, laboratory examination, ultrasonography, and abdominal CT scan were performed for all cases. The patients were also evaluated for flank pain, hematuria, and palpable mass. Partial nephrectomy was performed for tumors smaller than 4 cm and those in the solitary kidneys. All pathologic blocks were reviewed by a single expert pathologist. Histological diagnosis was made as RCC according to the classification of the Union Internationale Contre Le Cancer and American Joint Committee on Cancer Workshop.[6] Nuclear grade was assessed using Fuhrman table.[7] Tumor stage was assessed using the TNM classification of RCC, version 1997.[8] Sizes of the tumors were categorized into less than 4 cm, between 4 cm and 7 cm, and greater than 7 cm. The relationship between the size of the tumor and the dichotomous or categorical variables was analyzed by the *t* test and Kruskal-Wallis test. The chi-square test was used to evaluate categorical variables. A *P* value less than .05 was considered significant.

RESULTS

There were 138 men (65.1%) and 74 women (34.9%) who underwent nephrectomy. The mean age of the patients was 55.3 ± 13.9 years (range, 5 to 82 years). There were 195 patients (92%) with a malignant tumor and 17 (8%) with a benign one (Table 1). The mean ages of the patients with benign tumors and malignant tumors were 47.0 ± 18.6 years and 55.9 ± 13.2 years, respectively (*P* = .01). Size of the tumors varied from 1 cm to 19 cm and benign tumors were not significantly smaller than the malignant ones (*P* = .10; Table 1). According to the available hospital records of 210 patients, the tumor had been incidentally discovered in 53 cases (25.2%), and it had been manifested by flank pain, hematuria, and mass feeling in 157 (74.8%). The presence of symptoms at presentation did not have a relation with the type of tumor (benign versus malignant; *P* = .55).

Table 1. Pathologic Classification and Size of Kidney Tumors*

Type	Number (%)	Size, cm†
Malignant tumors		
RCC	179 (84.4)	6.98 ± 3.09 (1.00 to 17.00)
TCC of pelvis	10 (4.7)	7.45 ± 4.62 (3.00 to 19.50)
Wilms tumor	3 (1.4)	9.83 ± 3.62 (7.00 to 14.50)
Metastatic SCC	2 (0.9)	9.00 ± 1.41 (8.50 to 10.00)
Sarcoma	1 (0.5)	6.00
Benign tumors		
Adenoma	6 (2.8)	4.45 ± 2.04 (1.20 to 7.00)
Oncocytoma	5 (2.4)	7.60 ± 2.10 (5.50 to 10.50)
Angiomyolipoma	5 (2.4)	5.60 ± 0.89 (5.50 to 7.00)
Leiomyoma	1 (0.5)	5.50
Total	212 (100.0)	6.96 ± 3.11 (1.00 to 19.00)

*RCC indicates renal cell carcinoma; TCC, transitional cell carcinoma; and SCC, squamous cell carcinoma.
†Values are demonstrated as means ± standard deviations (ranges), except for tumors which are found only in 1 patient.

One hundred and eighteen patients with RCC (65.9%) were men and 61 (34.1%) were women. Their mean age was 56.5 ± 12.3 years. A total of 58.6% of the RCC tumors were right-sided. The mean size of the RCC tumors was 6.98 ± 3.09 cm. The RCC tumor sizes were greater in the symptomatic patients (*P* = .02; Table 2), and the grade of tumor increased with the increment in tumor size (*P* = .007; Table 3). But, grade was not higher in symptomatic patients (*P* = .19).

The most frequent RCC tumor types were clear cell in 97 (54.2%) and papillary cell in 49 (27.4%) patients. The mean size of the papillary tumors did not significantly differ from clear cell tumors (6.95 ± 3.14 cm versus 7.00 ± 3.02 cm; *P* = .67). Of the clear cell tumors, 16.5%, 43.3%, and 40.2% and of the papillary tumors, 14.3%, 51.0%, and 34.7% were smaller than 4 cm, 4 cm to 7 cm, and larger than 7 cm, respectively. The other tumor types in the RCC patients were mixed cell, chromophobe, scarcomatoid, and collecting duct tumors in 16 (8.9%), 6 (3.4%), 8 (4.5%), and 1 (0.6%).

Finally, the stage increased by increasing the size of the RCC tumors (*P* < .001; Table 4), but it was not higher in symptomatic patients (*P* = .22). With greater tumor sizes, extracapsular extension (stages T3 and T4) was more frequent (*P* < .001), and there was only 1 patient with a small tumor (< 4 cm) and

Table 2. Size of Tumor and Symptoms in RCC Patients*

	Tumor Size			
Manifestation	< 4 cm	4 cm to 7 cm	> 7 cm	Total
Asymptomatic	12 (25.0)	24 (50.0)	12 (25.0)	48 (26.8)
Symptomatic	17 (13.0)	59 (45.0)	55 (42.0)	131 (73.2)
Total	29 (16.2)	83 (46.4)	67 (37.4)	179 (100.0)

*Values in parentheses are percents.

Table 3. Nuclear Grade and Size of Tumors in RCC Patients*

	Tumor Size			
Grade	**< 4 cm**	**4 cm to 7 cm**	**> 7 cm**	**Total**
1	3 (25.0)	9 (75.0)	0	12 (6.7)
2	22 (21.2)	48 (46.2)	34 (32.7)	104 (58.1)
3	4 (4.7)	22 (40.7)	28 (51.9)	54 (30.2)
4	0	4 (44.4)	5 (55.6)	9 (5.0)
Total	29 (16.2)	83 (46.4)	67 (37.4)	179 (100.0)

*Values in parentheses are percents.

Table 4. Size of Tumor and Stage in RCC Patients*

	Tumor Size			
Stage	**< 4 cm**	**4 cm to 7 cm**	**> 7 cm**	**Total**
T1	25 (32.5)	51 (66.2)	1 (1.3)	77 (43.0)
T2	3 (4.80	15 (24.2)	44 (71.0)	62 (34.6)
T3	1 (2.7)	17 (45.9)	19 (51.4)	37 (20.7)
T4	0	0	3 (100.0)	3 (1.7)
Total	29 (16.2)	83 (46.4)	67 (7.4)	179 (100.0)

*Values in parentheses are percents.

a high stage ($P = .009$). However, regarding the 4 cm as the cutoff, no significant difference was noted in nuclear grade ($P = .06$), clinical symptoms ($P = .15$), and histological subtype ($P = .67$).

DISCUSSION

According to our findings, size of the tumor is not a precise criterion for differentiation of benign kidney tumors from malignant ones. This data is in contrast with the findings of Frank and colleagues,[4] which may be due to our small sample size and also the differences in the genetic characteristics of the two groups of patients. However, in our study, the incidence of benign tumors was 8% that is in agreement with the literature (6.1 % to 16.9%).[4] A similar distribution of the tumors is seen in most studies and further studies are warranted to reveal the possible association of the tumor size and malignancy.

Nowadays, there are little documented information about the association of size with clinical and pathological features of the kidney solid masses. In our study, the number of patients with clinical symptoms increased with increment in the size of the tumor, but not with grade or stage. Furthermore, size of the tumor did not have a relation with the pathological subtype. On the other hand, smaller tumors (< 4 cm) were not statistically different from larger ones in nuclear grade ($P = .06$), symptoms ($P = .15$), and histological subtypes ($P = .67$); however, the rate of extracapsular extension (stages T3 and T4) was 3.4% for tumors smaller than 4 cm, 20.5% for those between 4 cm and 7 cm, and 32.8% for those larger than 7 cm. It is believed that the size of 4 cm seems to be a significant cutoff point for extracapsular extension and nephron-sparing surgery for tumors under this point seems to be safe.[9,10] Further prospective studies are warranted to determine the relation between the tumor size and the histological subtype or the tumor size and the nuclear grade.

CONCLUSION

Although malignant tumors were larger in our study, tumor size was not a predicting factor for differentiation between benign and malignant tumors. In RCC tumors, size of the lesion had a relation with symptoms, nuclear grade, and tumor stage, but not with the histological subtype.

CONFLICT OF INTEREST

None declared.

REFERENCES

1. Lau WK, Cheville JC, Blute ML, Weaver AL, Zincke H. Prognostic features of pathologic stage T1 renal cell carcinoma after radical nephrectomy. Urology. 2002;59:532-7.
2. Luciani LG, Cestari R, Tallarigo C. Incidental renal cell carcinoma-age and stage characterization and clinical implications: study of 1092 patients (1982-1997). Urology. 2000;56:58-62.

3. Patard JJ, Rodriguez A, Rioux-Leclercq N, Guille F, Lobel B. Prognostic significance of the mode of detection in renal tumours. BJU Int. 2002;90:358-63.

4. Frank I, Blute ML, Cheville JC, Lohse CM, Weaver AL, Zincke H. Solid renal tumors: an analysis of pathological features related to tumor size. J Urol. 2003;170:2217-20.

5. Guinan PD, Vogelzang NJ, Fremgen AM, et al. Renal cell carcinoma: tumor size, stage and survival. Members of the Cancer Incidence and End Results Committee. J Urol. 1995;153:901-3.

6. Storkel S, Eble JN, Adlakha K, et al. Classification of renal cell carcinoma: Workgroup No. 1. Union Internationale Contre le Cancer (UICC) and the American Joint Committee on Cancer (AJCC). Cancer. 1997;80:987-9.

7. Fuhrman SA, Lasky LC, Limas C. Prognostic significance of morphologic parameters in renal cell carcinoma. Am J Surg Pathol. 1982;6:655-63.

8. Sobin LH, Fleming ID. TNM Classification of Malignant Tumors, fifth edition (1997). Union Internationale Contre le Cancer and the American Joint Committee on Cancer. Cancer. 1997;80:1803-4.

9. Lau WK, Blute ML, Weaver AL, Torres VE, Zincke H. Matched comparison of radical nephrectomy vs nephron-sparing surgery in patients with unilateral renal cell carcinoma and a normal contralateral kidney. Mayo Clin Proc. 2000;75:1236-42.

10. Fergany AF, Hafez KS, Novick AC. Long-term results of nephron sparing surgery for localized renal cell carcinoma: 10-year follow up. J Urol. 2000;163:442-5.