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Original Article

Frequency of Benign Lesions in Radiologically Presumed Renal Cell Carcinoma Taking Histopathology as Gold Standard

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ABSTRACT

Renal cell carcinoma (RCC) comprises for between 90-95% of renal neoplasms in adults and about 3% of all malignancies overall. **Objective:** To ascertain the prevalence of benign lesions in radiologically presumed renal cell carcinoma ≤ 7 cm, using histology as the gold standard **Methods:** A prospective cross-sectional study was undertaken at the department of urology. A total number of 131 patients who were diagnosed possibly as RCC on CT scan. Demographic characteristics (age and gender), size of renal mass both pre-operatively and per-operatively were noted. After nephrectomy, the specimen was sent to histopathology laboratory for confirmation of diagnosis. Histopathology reports were analyzed post operatively and frequency of benign lesions in radiologically presumed RCC was determined. **Results:** Mean age of patients included in this study was 52.02±13.18 years. Mean size of mass pre-operatively was 4.89±1.47 cm. Mean size of mass per-operatively was 5.07±1.44 cm. There were 87(66.41%) male and 44 (33.59%) female patients. Incidental diagnosis was made in 25 (19.08%) patients. Symptomatic predisposition was found in 107 (81.68%) patients. Partial nephrectomy was performed in 59 (45.04%) and radical nephrectomy was performed in 72 (54.96%) patients. Malignancy was diagnosed in 109 (83.21%) patients and benign lesions were diagnosed in 22 (16.79%) patients on histopathology reporting. **Conclusion:** The frequency of benign lesions in radiologically presumed renal cell masses in our study is 16.8%. The findings of this study may assist urologist in advising patients who have small renal masses and choosing the best course of action.

INTRODUCTION

Renal cell carcinoma (RCC) comprises for between 90-95% of renal malignancies, is the sixth most common cancer in men and tenth in women [1]. In developed nations, where incidence rates are higher and up to half of cases discovered incidentally [2]. Due to the widespread use of abdominal imaging for a variety of renal specific and non-specific complaints, the incidental identification of renal masses has significantly increased over time [3]. According to current estimates, accidental detection accounts for more than half of all kidney masses [4, 5]. The majority of renal mass lesions were once considered to be cancerous, while benign lesions like oncocytoma(3-5%), angiomyolipoma(0.7-2%), and metanephric adenoma(0.1%) were believed to occur just as commonly in incidental tumours as in larger and more prevalent symptomatic lesions [6]. Recent research questioned this paradigm by showing that 20% of small kidney tumours had pathologically benign characteristics [7]. One of the few tumours that has historically only been treated based on the radiological presumption of malignancy is kidney neoplasms. For decades, urologists have held that surgical removal of malignant renal masses was always necessary, hence knowing the histology of the tumour before removal did not affect the decision on therapy. [8]. In contrast, we now know that incidentally discovered kidney masses are frequently benign or malignant tumours with somewhat indolent behaviour [9]. According to numerous research, men are less likely than women to experience benign

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histology findings after undergoing kidney surgery [10, 11]. Historically, the standard therapy for renal cell carcinoma has been radical nephrectomy (RN) [12]. Nephron-sparing surgeries (NSS) has revolutionized kidney cancer care [13]. Suang Hwan lee et al concluded that rate of extirpative surgery for tumor up to 7 cm have increased from 5% before 1998 to 21.2% after 2003. Among 290 cases which undergo partial nephrectomy, 52 (17.9%) reveal benign histology [14]. In a research by Lane BR, which contained data on 862 individuals with small renal masses, 20% of the tumours were benign and 80% were malignant, although only 30% of the tumours were potentially aggressive cancers (24% of the small renal masses) [15]. Another study that investigated the prevalence and risk factors for benign renal mass in 450 individuals who had small renal masses underwent surgical excision, found that 88(19.9%) of the renal masses were benign [16]. Unfortunately, it is still difficult to predict the biological potential of renal mass, and patient decision-making and counselling are suboptimal. Given that majority of small renal mass are benign hence aim of our study is to quantify frequency of benign lesions in radiologically proven RCC. This will help urologist to incorporate biopsy as a routine investigation for lesion up to 7 cm to help them make a definite diagnosis and decide management accordingly thus reducing incidence of unnecessary surgeries, decreasing overall financial burden as well as morbidity of patient.

METHODS

A prospective cross-sectional study was undertaken at the department of Urology in Sindh Institute of urology and transplantation, Karachi from 16th November 2019 to 15th May 2022. Based on the proportion 21.2 % of extirpative surgery for benign lesions <7 cm in patients with 95% confidence level and margin of error 7%, a total of 131 patients were included [14]. Data was collected on the structured proforma after obtaining approval from Institute of ethical committee and after obtaining informed written consent from study subjects. All the patients age between 20-70 years who had been diagnosed possibly as RCC (size ≤ 7cm) on CT scan due to either solid masses or enhanced cystic lesions were included in this study. This research excluded patients who were unable to undergo general anesthesia, had metastatic RCC, were known to have non-RCC diagnoses, a benign non-functioning kidney, had known genetic susceptibility to RCC (such as VHL or Birt-Hogg Dube Syndrome), or had preoperatively biopsy proven RCC. Demographics characteristics (age and gender), size of renal mass both pre-operatively and per-operatively were noted. We also observed, whether the mass is diagnosed incidentally or symptomatically and if any genetic predisposition of the disease. After nephrectomy, either performed open, laparoscopic or robotic, the specimen was sent to histopathology laboratory for confirmation of diagnosis. Histopathology reports were analyzed post operatively and frequency of benign lesions in radiologically presumed RCC was determined. All the data was entered and analyzed using SPSS version 23.0. Descriptive statistics were used to summarize the continuous and categorical variables. Continuous variables such as age, size of mass pre-operative and per operative were presented as mean and standard deviation. Categorical variables like gender, incidentally diagnosed, symptomatic predisposition, and procedure performed were presented as frequencies and percentages. Effect modifiers age, size of mass pre and per-operative were controlled by stratification by outcome variable, histopathology findings benign and malignant as gold standard. After stratification, non-parametric sign test was used and P-value less than 0.05 were considered as significant.

RESULTS

Of the 131 patients there were 87 (66.41%) male and 44 (33.59%) female patients. Incidental diagnosis was made in 25 (19.08%) patients. Symptomatic predisposition was found in 107 (81.68%) patients and it was not found in 24 (18.32%) patients. On frequency of procedure performed, partial nephrectomy was performed in 59 (45.04%) patients and radical nephrectomy was performed in 72 (54.96%) patients. On histopathology, malignancy was diagnosed in 109 (83.21%) patients and benign lesions were diagnosed in 22 (16.79%) patients (Figure 1).

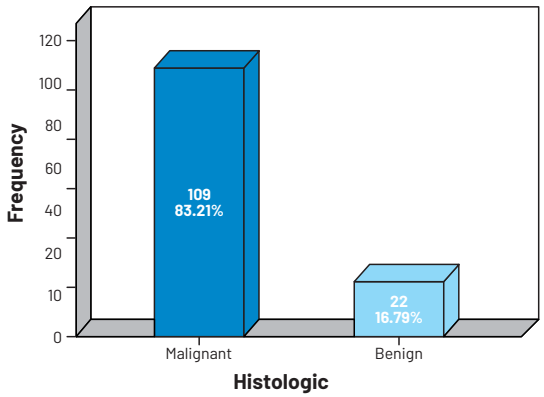

Figure 1: Frequency of histologic diagnosis

*P value < 0.01 was considered statistically significant using Sign Test

Descriptive variables of age and renal mass are given in table 1.

Descriptive statistics	Mean ± S.D	Minimum	Maximum
Age	52.02±13.18	20	70
Size Of Mass Pre-Operatively	4.89±1.47	02	07
Size Of Mass Per-Operatively	5.07±1.44	02	09

Table 1: Descriptive variables of age and renal mass

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There was no association of age with histologic diagnosis, in age group 20-50 years; malignancy was diagnosed in 49 patients and benign lesions in 13 patients. In patients having age 51-70 years, malignancy was diagnosed in 60 patients and benign lesions in 09 patients. This difference was statistically insignificant with p-value of 0.226. There was no association of gender with histologic diagnosis. In male patients, malignancy was diagnosed in 74 patients and benign lesions in 13 patients. In female patients, malignant was diagnosed in 35 patients and benign lesions in 09 patients. This difference was also statistically insignificant with p-value of 0.425. Stratification was also performed on the basis of size of mass pre-operatively and size of mass per-operatively Table 2.

Descriptive statistics of renal mass	Histological diagnosis		p-Value*
	Malignant	Benign	
Size Of Mass Pre-Operatively			
2.0 – 4.90 cm	46 (78%)	13(22%)	<0.01
5.0 – 7.0 cm	63(87.5%)	09(12.5%)	<0.01
Size Of Mass Per-Operatively			
2.0 – 4.90 cm	39(81.3%)	09(18.8%)	<0.01
5.0 – 9.0 cm	70(84.3%)	13(15.3%)	<0.01

Table 2: Descriptive statistics of renal mass pre and per operatively

*P<0.01 was considered statistically significant using Sign test

DISCUSSION

In 2018, more than 400,000 new cases of kidney cancer were identified [17]. Nearly half of all new occurrences of renal cell carcinoma (RCC) are localized tumors, and small, localized lesions are the ones that have increased the highest in incidence rate. The increased inadvertent discovery of small renal masses is assumed to be related to greater use of imaging technologies [18]. Advances in preoperative imaging techniques have made it possible to identify smaller lesions, but they are typically unable to distinguish RCC from benign lesions such oncocytoma or lipid-poor angiomyolipoma (AML) [19, 20]. According to existing literature benign lesions are diagnosed in up-to 20% of the cases after nephrectomy on histopathological reporting among patients who were presumed to have malignant lesions on radiological diagnosis. In present study, benign lesions were diagnosed in 16.8% patients of radiologically presumed malignant lesions. According to a study by the Memorial Sloan-Kettering Cancer Center, non-RCC mass incidence increased from 1996 to 2002 from 16.9% to 23% [21, 22]. According to Alana et al., benign tumours have become more common during renal surgery during the previous two decades. Extirpative surgery for benign lesions less than 7 cm increased significantly during the research period, rising from 5.0% before 1998 to 21.2% after 2003, when stratified by the year of surgery [23]. Although the proportion of benign tumours did not significantly raise when the incidence of benign pathology was stratified by year of surgery, the incidence of partial nephrectomy did increase. This result shows that, despite the current era's growth and advancement in CT imaging the likelihood of benign histology following surgery being mistakenly identified on CT imaging as a cancer had not diminished [24]. A 2004 research by Marszalek et al. on 129 people showed a benign rate of 32.6%. In a study done in 2006, it was shown that 16.1% of 143 people with renal tumours assumed to be malignant based on preoperative imaging actually had benign histology [25]. Lesions ≤ 4 cm were shown to have benign rates of 20–22% in two recent investigations [26, 27]. Similar outcomes are shown by Mullins et al. multicenter data of 873 patients, with a benign incidence of 23.1% for all patients receiving a robotic assisted partial nephrectomy [28]. For benign histology, the use of clinically based predictive models and imaging may be able to prevent some patients from superfluous procedures and their associated problems. Provocative data further support routine biopsy of renal masses in patients with suspected masses [29]. In individuals with equivocal clinical and radiographic symptoms, renal biopsy may be utilized to distinguish between benign and malignant histology. Earlier authors have highlighted the importance of biopsy in aiding risk categorization and management decisions, usually resulting in the avoidance of potentially avoidable surgery (for benign tumours or indolent cancers) [30]. Although 9/53(17%) were found to have been incorrectly assigned due to less favorable final pathology, the authors documented the reassignment of 53(26%) of those tumours to active monitoring as opposed to surgery [31]. In a series of 151 tumours, Halverson et al. discovered a 92% concordance rate between the final pathology and the biopsy [29]. Several indicators have been shown to accurately differentiate between benign lesions and RCC, such as the urine biomarkers aquaporin 1 and perilipin (clear and papillary subtypes) [32]. These models might lessen the amount of people who have benign lesions removed from their kidneys.

CONCLUSIONS

The frequency of benign lesions in radiologically presumed renal cell masses in our study is 16.8%. The findings of this study may assist urologist in advising patients who have small renal masses and choosing the best course of action, which may include renal biopsies and active monitoring, thereby lowering the frequency of unneeded procedures and the patient's related morbidity.

Conflicts of Interest

The authors declare no conflict of interest

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