ORIGINAL ARTICLE

Rate of Malignancy in the Complex Renal Cystic Lesions (Bosniak Iif, Iii, Iv) Single Center Study

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ABSTRACT

Aim: To determine the rate of malignancy in the complex renal cystic lesions.
Material and methods: We studied 111 patients both male and female above the age of 18 years with complex renal cystic lesions classified as Bosniak category IIF, III, and IV on CT. Patients with Bosniak categories I and II were excluded from the study. The rate of malignancy was analyzed.
Results: The mean age of the patients was 47.58±15.05 years. 27% of patients were Bosniak category IIF, 29.7% of patients were category III and 43.2% were category IV. The overall rate of malignancy was 62.2% in all patients who presented with complex renal cystic lesions. The rate of malignancy in Bosniak categories IIF,III and IV were 33.3%, 54.5% and 85.4% respectively.
Conclusion: Malignancy was observed in 62.2% of the patients who presented with complex renal cystic lesions. The rate of malignancy in Bosniak categories IIF,III and IV were 33.3%, 54.5% and 85.4% respectively.
Keywords: Malignancy, Renal cysts, Bosniak classification

INTRODUCTION

The far more common kidney lesion is a renal cyst. Renal cysts are still so common that they're identified in approximately 40% of individuals who already have kidneys evaluated. Cystic renal disease can sometimes be unilateral, bilateral, focal, and multifocal. Renal cysts developed as a result of an acquired or congenital disorder. The most typical type is acquired. Renal cysts range from mild to severe, the Bosniak classification was established as a classification system for adults having renal cysts. It was introduced in an attempt to systematize the evaluation and management of renal cysts [1-3.]

Autosomal recessive polycystic kidney disease (ARPKD) is just another sign of infantile polycystic kidney disease [4]. ARPKD demonstrates no gender preference. Due to the severity of the disorder, the diagnosis extends from newborns to childhood. Multicystic dysplastic kidney disease is a kidney condition that results in utero and is not acquired. It's usually unilateral, with the left side having a greater incidence [5]. Acquired kidney cysts are becoming more and more common as people grow older. It is reported that roughly 5% of the general population is affected. When it concerns the individuals > 50, the proportion climbs to even more than 25%. Renal cysts contribute up to 65-70 % of renal masses in the geriatric [6].

The Bosniak classification system is used nationwide, which depends on computed tomography (CT). After excluding certain diseases such as infections, inflammation, and vascular disorders, this separates renal cystic lesions into 4 categories [7]. Because Bosniak types I and II are simple and slightly difficult cysts, they do not require extra investigation [8,9]. Bosniak categories IIF are ambiguous, they are probably to have benign features that warrant further research or follow-up, such as with a hemorrhagic cyst > 3 cm with dense calcifications [10-12]. During monitoring, a tiny fraction of Bosniak IIF renal cystic lesions become ever more complex, which is associated with an increased risk of malignancy [13]. Bosniak III and IV are advanced renal cystic lesions with dilated walls, or the prominence of solid tissue components, which differs between categories III and IV[14].

However not enough literature is available in our country, therefore the present study aims to evaluate the frequency of malignancy of renal cystic lesions in Bosniak IIF, III, and IV in the Pakistani population. This study is conducted at Sindh Institute of Urology and Transplantation (SIUT) Karachi Pakistan which is Pakistan's largest Kidney disease center and receives patients from all over the provinces of Pakistan.

MATERIAL AND METHODS

This cross-sectional study was conducted at the Department of Urology, Sindh Institute Of Urology and Transplantation Karachi Pakistan for one year. Ethical clearance was taken from the hospital's ethical committee. 111 patients with complex renal cystic lesions classified on CT as Bosniak IIF, III, and IV, both genders greater than 18 years were enrolled in the study. Patients with renal cysts classified as Bosniak category I and II on CT were excluded. The renal cyst was defined as fluid-filled sacs that develop in the kidneys containing a watery fluid. Bosniak classification was defined according to the Bosniak Classification of Cystic Renal Masses, Version 2019[9]. Baseline characteristics and malignancy rate was recorded.

The sample size (111) was calculated using an openepi calculator with the following parameters.

- 17% anticipated frequency of malignancy for Bosniak IIF[2]
- 7% margin of error
- 95% confidence interval

The data was analyzed using SPSS version 20. Numerical variables were calculated using Mean and Standard Deviation and categorical variables were presented as frequencies and percentages. Malignancy was stratified with age and gender using the Chi-Square test keeping P < 0.05 as significant.

RESULTS

This study was conducted on 111 patients. The mean age of the patients was 47.58±15.05 years. According to baseline characteristics, the majority of the patients were males accounting for 62.2% of total patients. The majority of the patients presented were greater than 50 years (44.1%). According to Bosniak classification, 27% of patients were category IIF, 29.7% of patients were category III and 43.2% were category IV (Table 1). The overall rate of malignancy was 62.2%. Malignancy according to Bosniak's classification can be seen in table 2. Our results did not show statistically significant association between gender and age (P = 0.78; P = 0.38).

Table 1: Baseline characteristics (n =111)

Variables		Value
Gender	Male	69 (62.2%)

	Female	42 (37.8%)
Age (Years)	18 to 30	17 (15.3%)
	31 to 50	45 (40.5%)
	>50	49 (44.1%)
Bosniak classification	IIF	30 (27%)
	III	33 (29.7%)
	IV	48 (43.2%)

Table 2: Malignancy according to Bosniak classification;

		Malignancy		Total
		Yes	No	
Bosniak classification	Bosniak IIF	10	20	30
		33.3%	66.7%	100.0%
	Bosniak III	18	15	33
		54.5%	45.5%	100.0%
	Bosniak IV	41	7	48
		85.4%	14.6%	100.0%
Total		69	42	111
		62.2%	37.8%	100.0%

Table 3: Association of malignancy with gender;

		Gender		Total	P value
		Male	Female		
Malignancy	Yes	46	23	69	0.06
		66.7%	33.3%	100.0%	
	No	23	19	42	
		54.8%	45.2%	100.0%	
Total		69	42	111	
		62.2%	37.8%	100.0%	

Table 4: Association of malignancy with age;

		Age distribution			Total	P value
		18 to 30	31 to 50	>50		
Malignancy	Yes	7	29	33	70	0.93
		10.2%	42%	47.8%	100.0%	
	No	10	16	16	44	
		24%	38%	38%	100.0%	
Total		17	45	49	111	
		15.4%	40.5%	44.1%	100.0%	

DISCUSSION

Renal ultrasonography has become one of the most often utilized medical imaging methods in patients with suspected renal illness due to its noninvasiveness, low cost, and widespread availability. Although less sensitive than computed tomography (CT) in detecting a renal mass, it can be utilized to distinguish between a simple, benign renal cyst and a complicated cyst or a solid tumor. The majority of renal cysts are benign small cysts that can be overlooked. Simple renal cysts are thought to affect roughly half of adults over the age of 50 and about 60% of those over the age of 60.[15]

Some benign kidney cysts, on the other hand, can be worsened by bleeding, infection, or calcification. Differentiating these from cystic renal tumors such as cystic renal cell carcinoma (RCC), multilocular cystic nephroma, and mixed epithelial and stromal tumors can be difficult (MESTs). with the addition of color for abdominal surveys and long-term follow-up, Doppler US (CDU) is the most commonly utilized imaging technology. As a result, all clinical specialists participating in abdominal ultrasounds should be aware of the characteristics of cystic renal lesions that can be recognized using this technology[16].

Based on CT imaging findings, the Bosniak classification system is used to categorize renal cystic lesions of nephron epithelial origin (cysts and cystic neoplasms). It should only be used for cystic lesions that are greater than 1 cm in diameter (in practice, starting at 10 mm). Fluid-filled masses with a thickened wall of urothelial (calyceal diverticulum, hydrocalix), infectious (chronic abscess), or parasitic (hydatid cyst) origin are also excluded from this classification system[17]. Based on CT results and the likely histological origin of the lesion, the Bosniak approach divides cystic lesions into four categories Bosniak I, II, IIF, III, and

IV. These classifications are used to predict cancer risk and standardize the treatment of cystic renal lesions [18]. We conducted this cross-sectional study to assess the rate of malignancy in 111 patients with Bosniak IIF, III, and IV complex renal cystic lesions. The overall rate of malignancy was 62.2%. The majority of the patients who presented with renal cystic lesions were above 50 years old. The male gender was more dominant as compared to females. In agreement with our findings, Hwang JH et al[11] in their study had a higher prevalence of male patients with a mean age of 60.1 years.

Increased numbers of thin septa or a slightly thicker but smooth septum/septa or wall may be present in moderately complex renal cysts in category IIF. They may also have thick, nodular calcifications that are devoid of contrast-enhancing components. The malignancy rate category IIF lesions in our study were 46.7%. Previous studies[10,19] have shown the malignancy rate in IIF lesions 0 to 25%, which is in contrast to our results 33.3%, the difference may be due to the smaller sample size used in our study. Hwang JH et al[11] in their study reported that in the radiologic progressive group, there was a low rate of radiologic progression and a high rate of malignancy, but there was a low rate of malignancy in the non-progressive group, indicating significant clinical reliability.

There is a wide range of malignancy rates for complex renal cystic lesions reported in studies in the literature ranging from 25% to 81 % for Bosniak category III lesions and from 67 % to 100 % for Bosniak category IV lesions [19–27][20]. Because older studies indicated lower malignancy rates but technological advancements and modifications to the Bosniak classification have played a major role in eliminating these discrepancies. The malignancy rate for Bosniak category III and IV lesions in this study were 45.5% and 85.4% respectively. In comparison to our findings, in a recent study conducted by Tse JR et al[21], the malignancy rate for Bosniak category III and IV lesions were 60% and 83%.

Our findings did not show statistical association between overall malignancy rate with gender and age (P = 0.06; P = 0.93). Similar findings were reported by Hwang JH et al[11], they did not find a significant association between malignancy in category IIF lesions between progressive and no progressive groups with age and gender (P = 0.9; P = 0.2).

CONCLUSION

The overall rate of malignancy in the complex renal cystic lesions was 62.2% in our study. The malignancy rate in Bosniak categories IIF, III, and IV were 33.3%, 54.5%, and 85.4% respectively.

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