

## Approach to Complex Renal Cysts: A Single-Center Experience

### Kompleks Renal Kistlere Yaklaşım: Tek Merkez Deneyimi

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#### ABSTRACT

**Objective:** In this study we aimed to present the data for patients followed-up and operated due to complex renal cysts using Bosniak classification system.

**Method:** Data of all patients followed-up or underwent surgery via open / minimal invasive methods due to complex renal cysts in our clinic between 2016 and 2019 were retrospectively evaluated. Bosniak category IIF and higher lesions were included in the study.

**Results:** A total of 83 patients were included in the study. The mean age of the patients was 52 ±10.1 years and 40 (48.2%) were male and 43 (51.8%) were female. Fifty-three (63.9%) patients had Bosniak IIF, 18 (21.7%) Bosniak III and 12 (14.5%) Bosniak IV lesions. Mean lesion size was 54±27.4 mm based on radiological evaluation. Surgery was performed in a total of 41 (49.4%) patients. Based on final pathology results, benign pathologies were detected in 13 (31.7%), clear cell renal cell carcinoma in 22 (53.7%), and papillary renal cell carcinoma in 6 (14.6%) patients. Malignancy rates were detected as 18.9%, 44.4% and 83.3% in Bosniak IIF, III and IV lesions, respectively. While the mean lesion size of the patients who had benign pathology was 64.6±18.4 mm, the mean lesion size of the patients with malign pathology was 58.3±29.7 mm (p = .41).

**Conclusion:** Progression is an important finding of malignancy in Bosniak IIF lesions. An important amount of especially Bosniak III lesions are receiving unnecessary treatment. Thus, active surveillance is a treatment which should be considered in these patients. More comprehensive prospective randomized studies are needed.

**Keywords:** Bosniak classification, active surveillance, complex, renal cyst, renal surgery

#### ÖZ

**Amaç:** Biz bu çalışmamızda kompleks böbrek kisti nedeniyle Bosniak sınıflama sistemi kullanılarak takip edilen veya opere edilen hastaların verilerini sunmayı amaçladık.

**Yöntem:** Kliniğimizde 2016-2019 yılları arasında kompleks böbrek kisti nedeniyle takip edilen veya açık / minimal invaziv yöntemler ile opere edilen tüm hastaların verileri retrospektif olarak incelendi. Bosniak kategorisi IIF ve üstü lezyonlar çalışmaya dahil edildi.

**Bulgular:** Çalışmaya toplam 83 hasta dahil edildi. Hastaların ortalama yaşı 52 ±10,1 yıl iken 40'ı (%48,2) erkek ve 43'ü (%51,8) kadın idi. 53 (%63,9) hastada Bosniak IIF, 18 (%21,7) hastada Bosniak III ve 12 (%14,5) hastada Bosniak IV lezyon mevcut idi. Görüntüleme ortalama lezyon boyutu 54±27,4 mm idi. Toplam 41 (%49,4) hastaya cerrahi uygulandı. Final patoloji sonucuna göre 13 (%31,7) hastada benign patolojiler saptanırken 22 (%53,7) hastada berrak hücreli renal cell karsinom ve 6 hastada (%14,6) papiller renal hücreli karsinom saptandı. Malignite oranları Bosniak IIF, III ve IV lezyonlar için sırasıyla %18,9, %44,4 ve %83,3 olarak saptandı. Nefrektomi geçiren benign gelen hastaların lezyon boyutları 64.6±18.4 mm iken patolojisi malign gelen hastaların lezyon boyutları ise 58.3±29.7 mm idi (p= .41).

**Sonuç:** Bosniak IIF lezyonlarda progresyon önemli bir malignite bulgusudur. Özellikle Bosniak III lezyonların önemli bir kısmı gereksiz tedavi edilmektedir. Bu yüzden, bu hastalarda aktif izlem göz önünde bulundurulması gereken bir tedavidir. Bununla birlikte, daha geniş kapsamlı, prospektif randomize çalışmalara ihtiyaç vardır.

**Anahtar kelimeler:** Bosniak sınıflaması, aktif izlem, kompleks, böbrek kisti, böbrek cerrahisi

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## INTRODUCTION

Renal cystic lesions are renal pathologies frequently observed in general population. It may be detected with a high incidence up to 50% especially after 50 years of age. Morton A Bosniak suggested 'Bosniak Classification' based on intravenous contrast-enhanced computed tomography (CT) findings in 1986 to provide the standardization of these common lesions. Bosniak classification is commonly used both by radiologists and urologists today. A score between I and IV is given to the lesions in the classification; while score I defines a simple cyst, score IV describes cysts with solid component and high malignancy potential<sup>(1)</sup>. While Bosniak I and II lesions are regarded as benign and require no surveillance, excision is recommended for Bosniak III and Bosniak IV lesions as 40-60% of Bosniak III lesions and more than 80% of Bosniak IV lesions have malignancy risk. Follow-up is suggested for Bosniak IIF lesions<sup>(2)</sup>. Several studies have shown that cystic renal cell carcinomas (RCC) have generally low grade and low stage malignancy potential<sup>(3,4)</sup>. Due to these reasons, active surveillance is considered as a reasonable treatment option in recent years as an alternative for surgery in Bosniak III lesions<sup>(5)</sup>.

Our objective in this study was to present the data for patients followed-up and operated with the indication of complex renal cysts using Bosniak classification system.

## MATERIAL and METHOD

After local ethics committee approval (2020/252) is obtained, data of all patients followed-up or operated via open / minimal invasive methods due to complex renal cysts in our clinic between 2016 and 2019 were retrospectively evaluated. Bosniak category IIF and higher lesions were included in the study. Patients who had any concurrent malignancy, multiple and/or bilateral complex cysts, previous renal surgery due to renal cyst or other pathologies, cases under 18 years of age and followed-up for less than 12 months, or delayed their follow-ups and patients whose data weren't completely reachable were excluded from the study. Informed consent form was obtained from all patients. Demographic data, preoperative CT findings, follow-up duration and final pathology results of the patients were analyzed. Bosniak categories of the patients were

determined according to intravenous contrast-enhanced CT findings. Bosniak IIF lesions without any progression detected at the end of minimum 12 months of follow-up were regarded as benign.

### Imaging Protocol

Abdominal CT imaging was performed on a 128-channel multi-detector CT (Somatom Definition AS, Siemens Healthcare, Erlangen, Germany). Imaging parameters were as follows: kVp: 120; effective mAs: 150; interslice gap: 0.6 mm. Reconstructions were obtained with 0.6 mm reconstruction spacing. All CT scans were performed with contrast material administration.

### Statistical Analysis

Acquired data were analyzed using IBM SPSS statistics package program version 21. Constant variables were given in mean  $\pm$  standard deviation, while categorical variables were expressed as numbers and percentages. Mann-Whitney U test was used for the comparison of constant variables and chi-square test for the comparison of categorical data between two groups.

## RESULTS

A total of 83 patients were included in the study. The mean age of the patients was  $52 \pm 10.1$  years and 40 (48.2%) were male and 43 (51.8%) were female. The patients had Bosniak IIF (n=53 :63.9%), III (n= 18 :21.7%), and IV (n=12: 14.5%) lesions. Mean lesion size was  $54 \pm 27.4$  mm. Mean duration of follow-up was  $21.3 \pm 5.9$  months. Demographic characteristics of the patients are shown in Table 1. Disease progression was observed and 11 (20.8%) Bosniak IIF lesions were treated surgically in follow-up. Thus, a total of 41 (49.4%) patients received surgical treatment. Based on final pathology results, benign pathologies were detected in 13 (31.7%), clear cell RCC in 22 (53.7%) and papillary RCC in 6 (14.6%) patients. T stages according to TNM classification were distributed as follows: : T1a (n=8: 28.6%), T1b (n=12: 42.9%), T2a (n=6: 21.4%), T2b (n=1:3.6%), T3a (n=1:3.6%). Malignancy rates were detected as 18.9%, 44.4% and 83.3% in Bosniak IIF, III and IV lesions respectively. Bosniak categories of patients who were detected to have malign and benign pathology are stated in Table 2. While the mean lesion size of patients who had benign pathology was  $64.6 \pm 18.4$  mm, mean lesion size of patients with malign pathology was  $58.3 \pm 29.7$  mm ( $p = .41$ ).

**Table 1. Patient and lesion characteristics.**

Variables		Mean ± SD
Age (Years)		52 ±10.1
Gender	Female	43 (51.8%)
	Male	40 (48.2%)
Location	Endophytic	44 (53%)
	Exophytic	27 (32.5%)
	Intrarenal	12 (14.5%)
Size (mm)		54±27.4
Bosniak Category	IIF	53 (63.9%)
	III	18 (21.7%)
	IV	12 (14.5%)
Follow-up (Months)		21.3±5.9
Surgery	Partial Nephrectomy	12 (29.3%)
	Radical Nephrectomy	29 (70.7%)
Final Pathology	Benign	13 (31.7%)
	Clear Cell RCC	22 (53.7%)
	Papillary RCC	6 (14.6%)
Stage	T1a	8 (28.6%)
	T1b	12 (42.9%)
	T2a	6 (21.4%)
	T2b	1 (3.6%)
	T3a	1 (3.6%)
	T3b	1 (3.6%)
Fuhrman Grade	Grade 1	7 (25%)
	Grade 2	17 (60.7%)
	Grade 3	3 (10.7%)
	Grade 4	1 (3.6%)
RCC: Renal cell carcinoma		

**DISCUSSION**

Parallel to the increasing use of cross-sectional imaging methods today, a dramatic increase is observed in the incidence rates of cystic renal disease and complex renal cystic lesions. Interpretation of complex renal cysts present different results mostly dependent on the interpreter (6). Bosniak classification is used for the classification of complex renal masses for more than 30 years. But it can be updated from time to time due to its present limitations (7).

**Table 2. Comparison of benign and malign lesions according to Bosniak categories.**

	Benign (n=12)	Malign (n=23)
Bosniak IIF	43 (81.1%)	10 (18.9%)
Bosniak III	10 (55.6%)	8 (44.4%)
Bosniak IV	2 (16.7%)	10 (83.3%)

Many studies have been made on Bosniak categories and surgical results of renal cysts. In a study on 216 patients who were operated due to complex renal cysts, pathologies with malignancy or low malignancy potential were seen in 175 (81%) patients (in 69.8% of Bosniak III, and 90.9% of Bosniak IV lesions) (8). Considering the benign character of nearly half of Bosniak III lesions, low malignancy potential and excellent prognosis, active surveillance has emerged as a preferable treatment method in recent years (5,9-11). The current European Association of Urology (EAU) Guideline states that active surveillance can be poorly recommended for Bosniak III lesions (12). In our study, malignancy was detected in 28 out of 41 (68.3%) patients who underwent surgery. Again, malignancy was detected in 44.4% of Bosniak III, and 83.3% of Bosniak IV lesions. These data actually show that a significant part of Bosniak III lesions were overtreated and active surveillance should be considered in selected cases in order to prevent overtreatment in Bosniak III lesions.

While Bosniak classification was found effective in Bosniak II, IIF and IV categories in a meta-analysis including 3036 patients, its e was reportedly low in Bosniak III lesions. It was detected that 49% of Bosniak III lesions were benign and overtreated. Disease progression was detected in 12% of Bosniak IIF cysts and 86% of these lesions were malignant. On the other hand, a malignancy rate below 1% was detected in the radiological follow-up of stable Bosniak IIF cysts (5). Also, disease progression was detected in 20.8% of Bosniak IIF lesions and malignity was detected in 90.9% of the patients with disease progression. These findings show that the detection of progression in follow-ups is an important finding of malignancy.

Şefik et al suggested the classification of Bosniak III lesions as category 3s and 3n. In that study, significantly higher malignancy rate was found in

Bosniak 3n group (86.7%) compared to 3s group (54.1%) ( $p=0.26$ ). Also the mean size of Bosniak III lesions with a malign character was significantly smaller than benign ones, ( $80\pm 55.9$  mm vs  $44.2\pm 27.5$  mm,  $p=0.005$ )<sup>(13)</sup>. Similar to Sefik et al., Lam et al.<sup>(2)</sup> reported malignant Bosniak type III lesions to be significantly smaller than benign ones, ( $3.52\pm 1.99$  cm vs.  $5.66\pm 2.53$  cm;  $p=0.041$ ). In concordance with the aforementioned studies, in the present study, while the mean size of benign lesions was  $64.6\pm 18.4$  mm, mean size of malignant lesions was  $58.3\pm 29.7$  mm ( $p = .41$ ). However, in another review by Richard et al.<sup>(9)</sup>, larger Bosniak type III lesions were reported to be more likely to be malignant compared to smaller lesions and since a significant proportion of these lesions (54%) are conceivably malignant, they suggested surgical treatment for these lesions.

In a study evaluating active surveillance and nephron-sparing surgery and their cost-effectiveness in the management of Bosniak IIF and III lesions, the malignancy rate was detected as 26% in Bosniak IIF, and 52% in Bosniak III lesions. As a result, the authors reported that active surveillance was a more cost-effective option in the management of Bosniak IIF and III lesions<sup>(14)</sup>. Detection of a relatively high rate of benign pathology in our patient group shows that a patient-oriented attitude should be presented while deciding operation in these patients.

Our study is also not without limitations. First of all, our study is a retrospective study and the number of patients is relatively low. Lack of long-term follow-up is another limitation which might be considered for designing further prospective studies.

## CONCLUSION

Progression is an important finding of malignancy in lesions. An important number of patients having complex renal cysts especially Bosniak type IIF and III lesions might be overtreated. Thus, active surveillance must be considered in these patients. Further comprehensive prospective randomized studies are needed.

**Ethics Committee Approval:** Bakirkoy Dr. Sadi Konuk Training and Research Hospital Clinical Research Ethics Committee (2020/12, 08.06.2020).

**Conflict of Interest:** None.

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**Informed Consent:** An informed consent was obtained from all the patients.

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