

# MALIGNIZATION RATE OF 1, 2, AND 2F BOSNIAK RENAL CYSTS IN MULTILOCULAR CYSTIC RENAL-CELL CARCINOMA

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## Abstract

Renal cysts are common anomalies of kidney structure, however in literature there are not so many researches, studying the malignization rate of 1,2,2F renal cysts, based on a large number of observations.

**Aim.** Identification of the malignization rate of 1, 2, 2F Bosniak renal cysts in multilocular cystic renal-cell carcinoma.

**Materials and methods.** In the period from January 2009 to December 2017 177 patients with 1, 2, 2F Bosniak renal cysts underwent laparoscopic decortication. In 10 cases the post-operative histological and immunohistochemical tests revealed focuses of multilocular cystic renal cell carcinoma, grade 1 (pT1a). This cohort included 5 men and 5 women, the mean age was 58,9 years. In 6 cases tumor localization on the right, in 4 - on the left.

**Results.** 177 patients with 1, 2,2 F renal cysts underwent surgical treatment. In 10 cases malignancy was detected. Total malignization rate was 5,65%. Malignization rate of 1 Bosniak renal cysts was 0%, 2 Bosniak renal cysts - 2,7% (2 out of 74 cases), 2F Bosniak renal cysts - 15,1% (8 out of 53 cases). Further all 10 patients underwent surgical treatment of renal cell cancer: in 8 cases - kidney resection, in 2 - nephrectomy. Median follow-up duration was 49,3 (31-72) months. Metastatic spreading or progression of the disease wasn't observed in any of the patients.

**Conclusion.** It is necessary to elaborate a modern algorithm of management of patients with 1, 2, 2F Bosniak renal cysts, including early onset of dynamic follow-

up. Organ-preserving operations should be the methods of choice, considering low malignant potential of such tumors.

**Key words:** renal cyst, neoplasm, multilocular cystic cancer, malignancy rate

### Relevance

Renal cysts are structural abnormalities of kidneys, characterized by formation of serous fluid containing cavities, limited by connective tissue. The prevalence of cysts in the general population is about 20-50% [1,2]. It is believed that the incidence of this pathology increases with age [3]. According to the results of autopsies, the prevalence of kidney cysts among people over 50 years of age is 50% [2]. In 1986 M. Bosniak offered a new classification of renal cysts and the tactics of treatment of patients with such pathology [4]. Later, in 1993, he proposed another category – 2F (follow up) - to the already existing 4 categories of cysts, it was proposed to refer to the formations that needed dynamic observation, hardly attributable to categories 2 or 3 [5-8] [see Fig. 1,2].

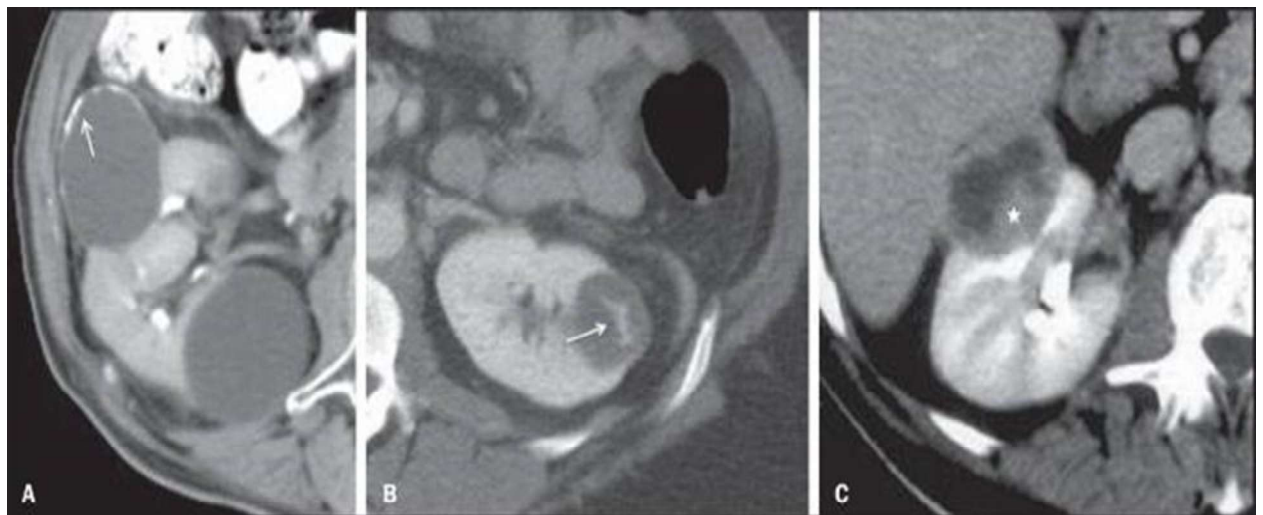


Fig. 1. A: Categories I and II. Contrast-enhanced, axial CT section demonstrates a cyst with smooth and imperceptible walls, category I, and another with fine calcifications on its walls (arrow), category II, both without perceptible contrast-enhancement. B: Category III. Contrast-enhanced axial CT section demonstrates a cyst with smooth walls and a thin septum with perceptible and measurable

enhancement after intravenous contrast injection (arrow). C: Category IV. Contrast-enhanced axial CT section demonstrates a mixed, thick-walled cystic-solid lesion with a solid component in the posterior wall (asterisk) that shows homogeneous enhancement after intravenous contrast injection [8].



Fig. 2. Bosniak II-F cyst. Contrast-enhanced CT image shows a partially exophytic cyst with a fine septation inside. Subtle nodularity is observed in the septum, which has perceptible but not measurable contrast-enhancement (arrow) [8].

One of the main goals of this classification is the malignization-risk stratification of renal cysts. For some time it was believed that the formations of groups 1 and 2, in contrast to the formations of groups 3 and 4, are absolutely benign, do not require surgical treatment [9]. However, many recent studies refute this point of view. Despite the special significance of malignization risk and dependence of treatment tactics on it, current literature is lacking large observational studies on this topic.

### **Aim**

To assess the incidence of malignant transformation of renal cysts of categories 1, 2, 2F by the Bosniak classification into multilocular cystic renal cell carcinoma.

## **Materials and methods**

From January 2009 to December 2017, 177 patients with renal cysts of category 1 (n=50, 28,2 %), 2 (n=74, 41,8%), 2F (n=53, 30%) underwent laparoscopic operation. In all patients undergoing surgical treatment, the presence of kidney cysts was accompanied by characteristic symptoms: regular dull pain in the lumbar region on the side of the affected kidney, nephrogenic hypertension, transient hematuria etc. The preoperative examination plan included examinations of the therapist and urologist, collection of the anamnesis, laboratory analysis of blood and urine, ECG, ultrasonography of abdominal and retroperitoneal space organs, contrast enhanced CT-scans, chest X-ray or CT, gastroscopy, duplex vein examination. Laparoscopic decortication was the operation of choice as the success of that operation is confirmed by a multitude of studies [10,11,12]. All the postoperative material was sent on a histological examination. In each case of surgical treatment, the material was delivered to the pathology laboratory, where a thorough histological examination was performed.

In some cases the material was sent to immunohistochemical analysis. When malignant nature of tumors was identified, their differentiation was determined in accordance with the nuclear gradation by Furman. The stage of the tumor process was established according to the 7th edition of the international classification of TNM.

## **Results**

177 patients underwent laparoscopic decortication. The distribution of patients according to Bosniak classification was as follows: renal cyst corresponding to stage 1 was diagnosed in 50 (28, 2%), stage 2 – in 74 (41.8%), stage 2F – in 53 (30%) patients.

In 10 cases, histological examination of the material revealed foci of the clear cell histotype of renal cell carcinoma, the material was additionally subjected to immunohistochemical analysis, the results of which in all cases revealed multilocular cystic renal carcinoma, Grade 1 (pt1a). According to the classification of kidney tumors of the world health organization (WHO), published in 2004,

multilocular cystic RCC, also known as multilocular clear cell RCC, was isolated in a separate morphological unit. By the decision of experts of the international society of urological pathologies (ISUP) of 2012 multilocular cystic RCC is referred to tumors with low malignant potential, therefore the term "multilocular cystic renal cell neoplasia of low malignant potential" is also used in the literature [13,14].

Foci of multilocular cystic renal cell carcinoma were detected in 10 cases, 2 of 10 had Bosniak 2 category, 8 of 10 had Bosniak 2F. The incidence of malignant transformation of renal cysts of categories 1,2,2F was 0%, 2,7% (2 of 74), 15,1 % (8 of 53) respectively. Subsequently, all ten patients were submitted to surgical treatment: 8 of them underwent partial nephrectomy and 2 of them underwent laparoscopic operation.

The average age of 10 patients with multilocular cystic RCC (5 women and 5 men) was 58.9 (50-71) years. Out of 10 patients, 6 (60%) had tumor lesion of the right kidney, 4 (40%) – of the left kidney (table. 1).

Table 1

Characteristics of the patients

Characteristics	Number of patients, n (%)
Age distribution of patients, years	
41-50	1 (10%)
51-60	7 (70%)
>60	2 (20%)
Sex	
Female	5 (50%)
Male	5 (50%)
Affected side	
Right	6 (60%)
Left	4 (40%)

Thus, a total of 74 patients with clinical diagnosis of acquired kidney cyst, category 2 according to Bosniak classification, underwent an operation. In 2 cases (2.7%) multilocular cystic RCC was diagnosed; 53 patients with clinical diagnosis of acquired kidney cyst, category 2F according to Bosniak classification, multilocular cystic RCC was diagnosed in 8 cases (15.1%); 50 patients with clinical diagnosis of acquired kidney cyst, category 1 according to Bosniak classification, no cases of malignancy were recorded (0%).

All patients with multilocular cystic RCC underwent surgical treatment. In 2 (20%) cases, lumbotomy and nephrectomy were performed. Organ-preserving surgery in the form of kidney resection was performed in 8 (80%) patients, in 2 (25%) cases laparoscopic access was applied (table. 2).

Table 2

Характеристика (Characteristics)	Число пациентов, n (%) (Number of patients), n (%)
Категории кист по классификации <u>Bosniak</u> : ( <u>Bosniak</u> category)	
1	50 (28,2%)
2	74 (41,8%)
2F	53 (30%)
Частота малигнизации для каждой категории: (Malignancy rate)	
1	0 (0%)
2	2 (2,7%)
2F	8 (15,1%)
Выполненная операция: (Performed surgery)	
<u>Люмботомия, радикальная нефрэктомия</u> ( <u>Lumbotomy, radical nephrectomy</u> )	2 (20%)
<u>Люмботомия, резекция почки</u> ( <u>Lumbotomy, kidney resection</u> )	6 (60%)
<u>Лапароскопическая резекция почки</u> ( <u>Laparoscopic kidney resection</u> )	2 (20%)

All 10 patients are observed in the center of urology after surgery. The median follow-up time was 49.3 (31-72) months. No cases of metastasis and recurrence of multilocular cystic RCC were recorded.

## **Discussion**

Since the publication of the classification of cystic formations in the journal of radiology, the approach to the management of patients with this pathology has changed dramatically. Bosniak classification allowed to systematize all cases of cystic kidney lesions, as well as to standardize the choice of treatment tactics. Its main advantage is the ability to predict the course of the disease and the risk of malignancy in each individual patient.

However, until now, there is no clear consensus on the real frequency of malignancy of cysts, depending on the belonging to a category according to the Bosniak classification. The number of published scientific studies, aiming to calculate the frequency of malignancy of cystic kidney formations, is not enough. Most of the articles related to this topic aim to identify the risk of malignancy of cysts of categories 3 and 4 according to Bosniak classification and provide similar results  $\geq 50\%$  and  $\geq 85\%$  respectively. [15, 16]

Despite the few articles indicating high frequency of malignancy of the formations of categories 2 and 2F, the prevailing opinion among urologists is that the formations are totally benign. According to the I. G. Schoots et al. the frequency of malignancy of category 2F cysts is  $<1\%$  [16]. According to Eknayan, the cysts of categories 2 and 2F are benign, but require periodic monitoring, particularly in young patients, by ultrasonography for 2-3 years [9]. T. F. Whelan in his work "Guidelines on the management of renal cyst disease " provides the following results: frequency of malignancy  $<1\%$  for category 1 cysts,  $<3\%$  for category 2 cysts and  $5\%$  for category 2F cysts according to Bosniak classification [17]. Smith et al. in their work «Bosniak category IIF and III cystic renal lesions: outcomes and associations» provides information on 4 (25%) cases of malignancy in a group of

16 patients with cysts of category 2F [18]. A number of other authors have also studied this issue, the results of these studies are given below (table. 3). [19,20].

Table3

Исследование (Study)	Категория кисты по классификации <u>Bosniak</u> ( <u>Bosniak</u> category)				
	1	2	2F	3	4
<u>O'Malley et al.</u>	-	-	0/81	27/33	-
Song et al.	0/3	3/26	0/3	21/38	32/37
Smith et al.	-	-	4/16	58/107	-

The literature does not describe confirmed cases of recurrence and metastasis of multilocular cystic renal cell carcinoma [21]. In our study, these data are confirmed: out of 10 patients with a median follow-up of 49.3 months, no signs of recurrence and metastasis were registered.

## Conclusion

A more modern algorithm for managing patients with Bosniak category 1, 2, 2F cysts must be developed to establish early surveillance of patients starting with category 1 cysts. Given the low malignant potential of these tumors, they should be treated with organsparing surgery and the intervals of examinations can be increased.

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