



ALGER,  
09 JUIN 2021

# Résultats anatomopathologiques des kystes rénaux BOSNIAK III et IV

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# Kystes et cancer du rein: Données épidémiologiques

- 2 à 3 % des tumeurs malignes [1],
- 84 400 nouveaux cas/an [2],
- 34 700 décès [2],
- 5 à 7% de tumeurs kystiques [3]
- 50 % de la population de plus de 50 ans présente un kyste rénal [4]

[1] European Network of Cancer Registries; 2001.

[2] Ferlay J, et al. Cancer incidence and mortality patterns in Europe. *Eur J Cancer* 2013;49(6):1374—403

[3] Bielsa O, et al. Cystic renal cell carcinoma: pathological features, survival and implications for treatment. *Br J Urol* 1998;82(1):16—20

[4] Siegel CL, et al. CT of cystic renal masses: analysis of diagnostic performance and interobserver variation. *AJR Am J Roentgenol* 1997;169(3):813-8

# Carcinome à cellules rénales kystique: Meilleur pronostic que les autres CCR

	CRCC (n, %)	RCC (n, %)	P
<i>Grade</i>			0.0071
I	6 (24)	20 (11)	
II	17 (68)	107 (59)	
III	2 (8)	38 (21)	
IV	–	16 (9)	
<i>Stage</i>			0.0033
1	22 (88)	98 (54)	
2	1 (4)	37 (20)	
3		16 (9)	
4	2 (8)	30 (17)	

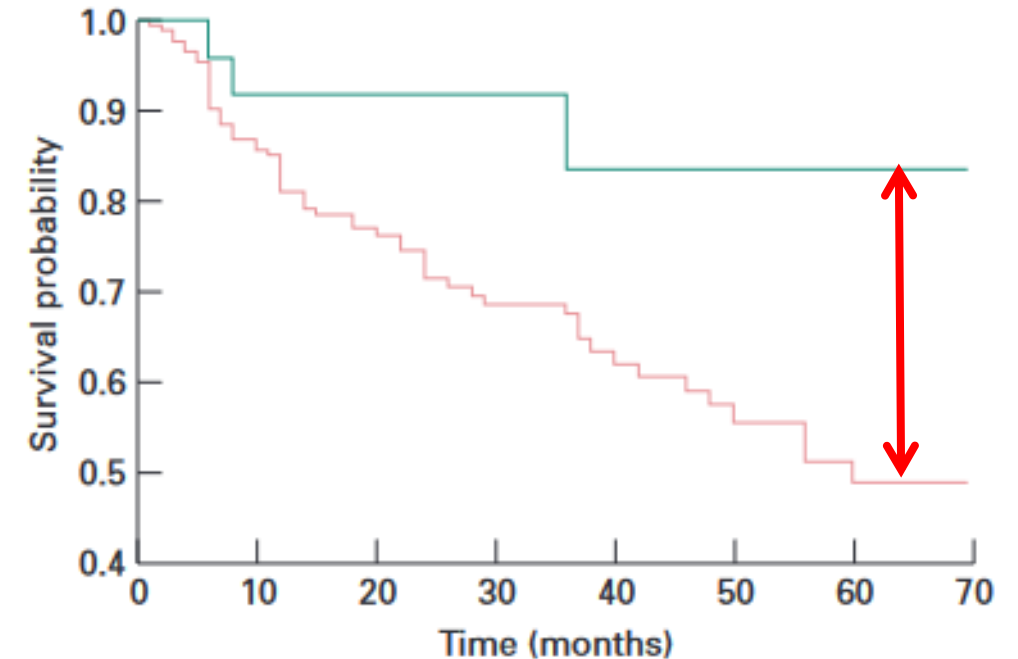


Fig. 4. Kaplan-Meier cumulative survival curve for patients with CRCC (green) and RCC (red). The curves are significantly different ( $P=0.342$ ).

# Kystes rénaux: Tumeur maligne ou bénigne??? Classification de Bosniak



Morton Arthur Bosniak  
1931-2016

## STATE OF THE ART

Morton A. Bosniak, MD

### The Current Radiological Approach to Renal Cysts<sup>1</sup>

**C**YSTS of the kidney, one of the most common conditions of the body, are usually one of the easiest conditions to diagnose accurately with imaging studies but occasionally are so complex that they defy diagnosis even by pathologic examination. The purpose of this paper is not to review and describe the myriad of renal cystic diseases or to give a new classification or a new nomenclature but, rather, to give an approach to the diagnosis of cysts of the kidney that are encountered in daily radiologic practice.

While simple, uncomplicated cysts are easy to diagnose and pose no problem, complicated cystic lesions can create considerable difficulty in diagnosis and can lead to a difference of opinion concerning the proper diagnostic and therapeutic approach. Many factors are involved in the decision about management of each individual case, including the clinical status of the patient, the availability and quality of equipment, and the experience (and philosophy) of the radiologist and the urologist. While space restrictions will not allow a discussion of all of these factors, it is hoped that a general approach to the diagnosis of renal cysts can be formulated based primarily on radiologic findings so that these commonly encountered lesions can be handled with accuracy in the most economical and least invasive manner possible.

The overwhelming majority of renal cysts are found by chance when an imaging study is performed to

evaluate a patient for a urinary tract or other abdominal or pelvic process. Only on rare occasions does the cyst call attention to itself by producing symptoms (pain) or signs (mass). Many cysts are discovered using urography, but currently they are discovered more often by means of ultrasound (US) or computed tomography (CT). The workup of the lesion will vary, depending on how it was detected.

#### SONOGRAPHY

If a mass is found by means of urography, unless the mass has characteristics (such as fat or calcification within the mass, increased tissue density, irregularity of margin, or invasion of the collecting system) that suggest it is something other than a simple benign cyst, generally it is agreed that sonography should be the next study because it is noninvasive, accurate, and relatively inexpensive. If the sonogram displays all of the criteria for a simple cyst, this diagnosis can be made with confidence and no further studies need be done. However, if there are compelling clinical aspects that create the need for further assurance of the benignity of the mass—such as unexplained hematuria or widespread metastatic disease without a known primary—then further confirmation is required. Sonographic criteria for cyst must be rigidly adhered to; any deviation from these criteria should lead to an additional radiologic study—a CT examination. The criteria needed to make a confident sonographic diagnosis of simple cyst have been described many times but they are repeated here because of their extreme importance: (a) good through transmission (acoustic enhancement behind the lesion consistent with the size of the lesion), (b) no echoes within the mass (anechoic), and (c) sharply marginated, smooth walls.

Diagnostic errors can be kept to a minimum if the following potential pitfalls are remembered:

1. If sonography is being performed to evaluate a mass seen on an excretory urogram (or CT scan), then the prior examination should be available for review to be certain that the mass in question is being evaluated. This will help eliminate the possibility of focusing on an adjacent cyst and not appreciating the lesion under suspicion. This will also help avoid the error of mistaking localized hydroureteritis or calyceal diverticulum for parenchymal cyst or a dilated renal pelvis for a peripelvic cyst.
  2. A clustering of cysts closely adjacent to one another may harbor a small carcinoma which could be missed on the US examination. Such cases should also be studied by CT.
  3. Vascular malformations or aneurysms, while rare, could be mistaken for cystic disease of the kidney if real-time studies do not demonstrate pulsations or large feeding vessels are not delineated.
  4. Because of their location adjacent to (and often interspersed between) the structures of the collecting system, peripelvic cysts often contain artifactually created echoes and need CT for confirmation.
  5. Lesions that contain calcium, septations, irregular margins, or any suspicious area should be studied further by CT.
- Cysts are also frequently discovered incidentally on sonograms. The same criteria for diagnosis described above are used, but since a urogram is not available for comparison, the potential pitfalls of sonography should be even more carefully considered.
- Since sonography is operator dependent, its accuracy, reliability, and definitiveness will be affected by the effort and experience of the individuals involved with the performance and interpretation of the examina-

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## THE USE OF THE BOSNIAK CLASSIFICATION SYSTEM FOR RENAL CYSTS AND CYSTIC TUMORS

The differentiation of benign complicated cystic lesions of the kidney that do not require surgery from those that require exploration or removal remains a more common and difficult problem in urological radiology. In an attempt to analyze these difficult cases, and explore and/or remove as few benign tumors as possible while removing all malignant lesions, a classification of cystic renal lesions ranging from simple uncomplicated benign cysts to cystic malignancies was presented in 1986.<sup>1</sup> During the last 10 years this system, referred to as the Bosniak classification, has been adopted by urologists and radiologists worldwide as a helpful method of analyzing these lesions. The system provides physicians a starting point in the evaluation of whether a complex cystic mass needs further diagnostic or therapeutic measures. The classification is based primarily on computerized tomography (CT) findings but decisions as to management are based on patient age and clinical condition along with other imaging findings, such as ultrasound, magnetic resonance imaging and rarely cyst aspiration. Various options for management are available to treat complicated lesions based on these findings, such as surgical resection, partial nephrectomy, exploration or followup. The classification system is also helpful because physicians can use it to communicate with each other about a case since it enables them to know approximately what is being referred to even without the benefit of images. This situation is similar to the grading of reflux. When one is told that a patient has grade II reflux, everyone familiar with the grading system has a mental image of what is present. While this may not be entirely true of the Bosniak classification, in which the separation between some of the categories is not as clear-cut, generally the classification works well. I will attempt to establish when the system can be used definitively, and where and why problems can occur, as well as clarify some points that may have created confusion recently regarding the Bosniak classification.<sup>2</sup>

It must be stressed from the outset that a top quality examination performed with modern equipment is essential for accurate diagnosis. Incomplete or poorly performed studies, or those done with older, outdated equipment cannot possibly provide the detail and quality of examination needed. On the other hand, many lesions have obvious findings and will be diagnosed correctly even with studies that are not of the highest quality, such as a simple cyst (category I) or cystic malignancies (category IV). However, for lesions that are difficult to classify or when a decision is necessary on whether to explore the patient, the quality of the examination can be vitally important and, in fact, it can be a most important factor in deciding on therapy.

The quality of CT depends greatly on the equipment available and the care given when performing the study. Although generally radiologists are responsible for CT, urologists should be cognizant of what constitutes an acceptable scan so that he or she can have a role in the radiological diagnosis and know when the examination is not adequate. A high quality CT includes films taken before and after intravenous contrast injection so that measurement of possible enhancement (vascularity) can be made. An adequate amount of contrast medium is necessary (generally 30 to 40 gm. iodine). Thin sections taken through the kidneys (generally 5 mm.) should be obtained. A discussion of further nuances in tech-

nique is not the purpose of this article but urologists should be aware of when an examination is and is not adequate.

The Bosniak classification system divides renal cystic lesions into 4 categories: I—simple cysts, II—mildly complicated but clearly benign cysts, III—more complicated cysts that need histological confirmation for diagnosis and IV—cystic neoplasms. Categories I and IV lesions are easily diagnosed. Category I includes simple cysts with all of their frequently described CT findings and can be diagnosed with 100% accuracy. Fortunately, they are the most common cystic lesions in the population, are frequently detected on CT and should not create a problem in diagnosis. Category IV includes cystic neoplasms of the kidney that require removal, which also should not be a problem in diagnosis. These lesions have cystic components that place them into the cystic lesion group but they also contain solid enhancing elements in at least a portion of the lesion, which makes them clearly malignant. These lesions should be diagnosed correctly almost 100% of the time. What benign lesions could mimic a category IV lesion? Probably none. However, rarely a chronic renal abscess with a thickened wall and areas of fluid debris can closely resemble a necrotic renal neoplasm on imaging studies. The necrotic portions can mimic cystic degeneration and, therefore, these lesions might be confused with cystic malignancies in many instances based strictly on imaging criteria. Differentiation may be possible if a history of infection, previous treatment with antibiotics or any clue that the lesion might represent an incompletely treated chronic abscess can be established. In such instances if an abscess is suspected aspiration of the cystic or necrotic component is indicated. If pus is obtained drainage and antibiotics are in order. If bloody debris is obtained the cyst should be surgically removed because a neoplasm is likely.


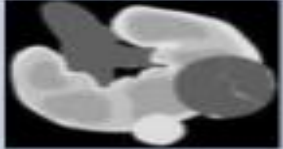
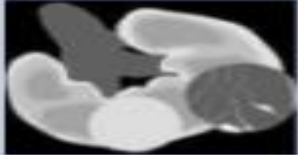
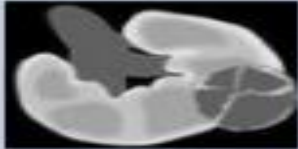
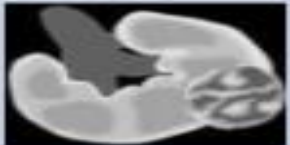
The main problem for radiologists and urologists is differentiating between more complicated category II lesions that do not require exploration from category III lesions that require surgery. Most category II lesions are easy to diagnose, such as a cyst with 1 or 2 thin septa running through them, or lesions that have thin, smooth areas of calcium within the wall or septum. However, as the number and thickness of the septa, and the amount and irregularity of the calcium in the lesion increase, the difficulty in deciding whether the lesion is a benign cyst also increases. There is no specific number that indicates how many millimeters of thickness or irregularity of calcium in the wall of a lesion can be present before the lesion is classified into category III and requires surgical exploration. Experience gained from previously dealing with similar lesions can be helpful. However, these complicated cystic neoplasms are the most difficult cases encountered and cause the most uncertainty. Generally, when in doubt the lesion should be considered as category III and explored.

However, there is also a role for a followup study approach in some of these cases.<sup>3</sup> For complicated cysts that are most likely benign (category II) but have some worrisome findings, followup CT could be performed to establish the benign behavior of the lesion (category IIF). An initial followup CT is performed at 6 months and 1 year, and then again after 1 more year so that during this period if the lesion has not changed in appearance a benign nature is established. This finding is particularly relevant in our older patient population, especially those with smaller lesions. We have used this

Index terms: Kidney, computed tomography, 81.1211 • Kidney, cysts, 81.31 • Kidney neoplasms, diagnosis, 81.32 • Kidney, ultrasound studies, 81.1208

<sup>1</sup> From the Department of Radiology, New York University Medical Center, New York.

Radiology 1986; 158:1-10  
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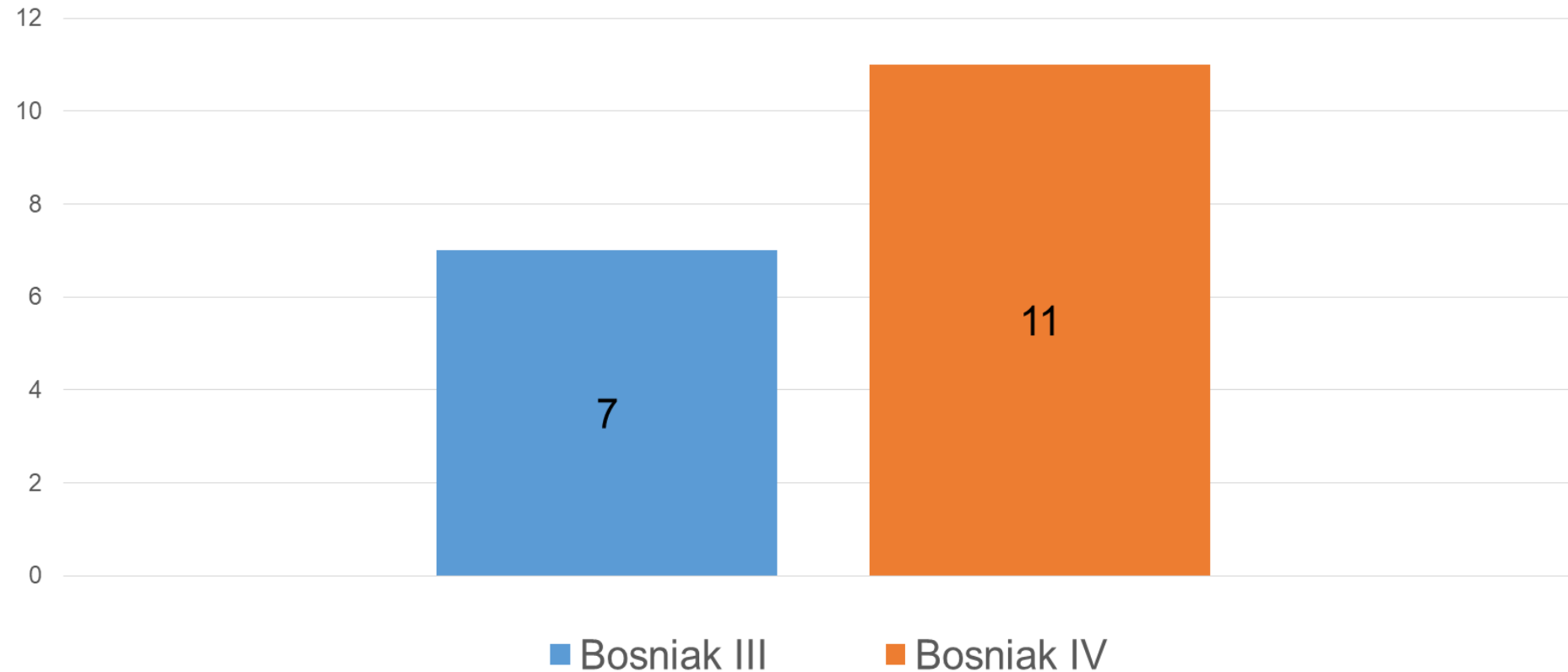
	Critères diagnostiques au TDM		Prise en charge recommandée	Probabilité de malignité (%)	Aspect du kyste
	Sans injection	Après injection			
Type I Kyste simple	Densité hydrique (< 20 UH) Homogène Limites régulières sans paroi visible	Absence de rehaussement (< 10 UH)	Aucune surveillance recommandée	0	
Type II Kyste atypique	Cloisons fines Fines calcifications pariétales Kyste hyperdense (> 50 UH)	Absence de rehaussement (< 10 UH)	Uniquement les kystes symptomatiques : Typiquement : résection du dôme saillant (laparoscopique ou robotique)	15	
Type IIF	Cloisons nombreuses et fines Paroi légèrement épaissie Calcifications pariétales et des cloisons, régulières Kyste hyperdense et entièrement intra-rénal, ≥ 3 cm	Absence de rehaussement ou rehaussement douteux	Surveillance tous les 6 mois pendant 5 ans par une imagerie En cas d'apparition de rehaussement des cloisons : arrêt surveillance exérèse selon les règles de la chirurgie oncologique	25	
Type III Kyste suspect	Cloisons nombreuses et épaisses Paroi épaissie Limites irrégulières Calcifications épaisses, irrégulières Contenu dense (> 20 UH)	Rehaussement de la paroi ou des cloisons	Chirurgie d'exérèse selon les principes oncologiques	50	
Type IV Cancer à forme kystique	Paroi épaisse et irrégulière Végétations ou nodule mural	Rehaussement de la paroi ou des végétations	Chirurgie d'exérèse selon les principes oncologiques	> 95	

# Taux de malignité des kystes III et IV?: Étude rétrospective du service d'urologie/HCA

- Période: janvier 2015 - Mai 2022
- NTE/NP pour kyste rénal classé III ou IV à la TDM
- Nombre de patients inclus: 18
- Résultats anapath des pièces opératoires.

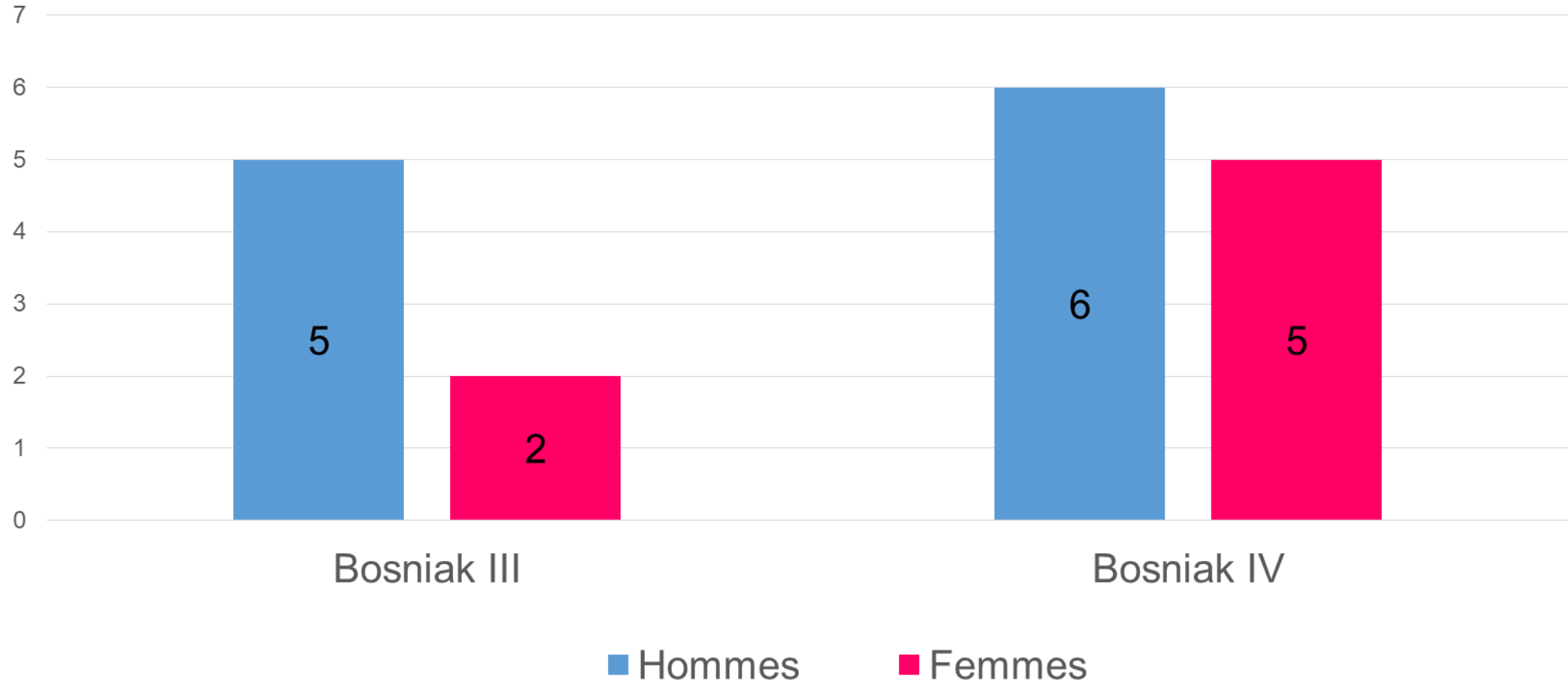
# Taux de malignité des kystes III et IV?: Étude rétrospective du service d'urologie/HCA

Répartition selon la classification de Bosniak



# Taux de malignité des kystes III et IV?: Étude rétrospective du service d'urologie/HCA

Répartition selon le sexe



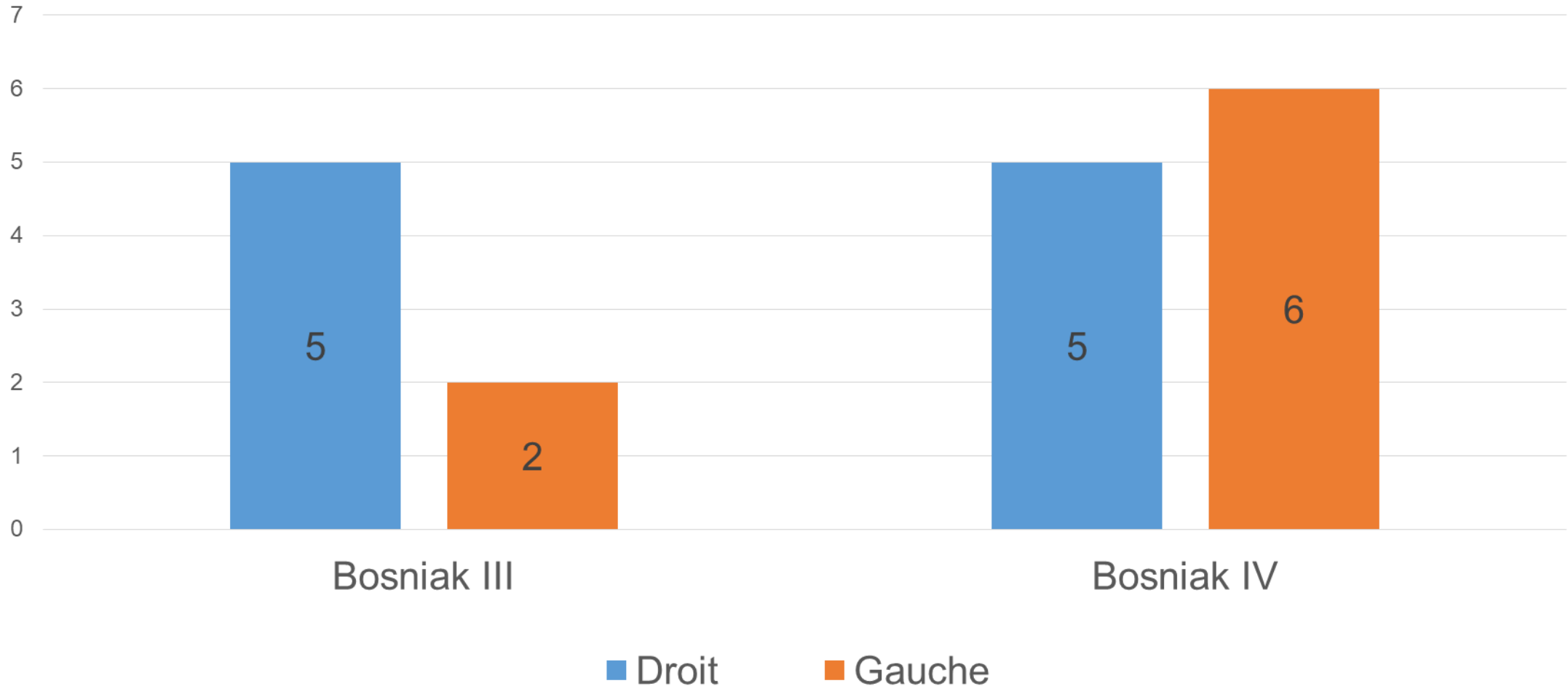
# Taux de malignité des kystes III et IV?: Étude rétrospective du service d'urologie/HCA

## Répartition selon l'âge

Bosniak III	Bosniak IV
50	48
63	43
55	77
47	79
35	82
54	66
23	62
-	58
-	51
-	17
-	57
<b>46,7</b>	<b>58,2</b>

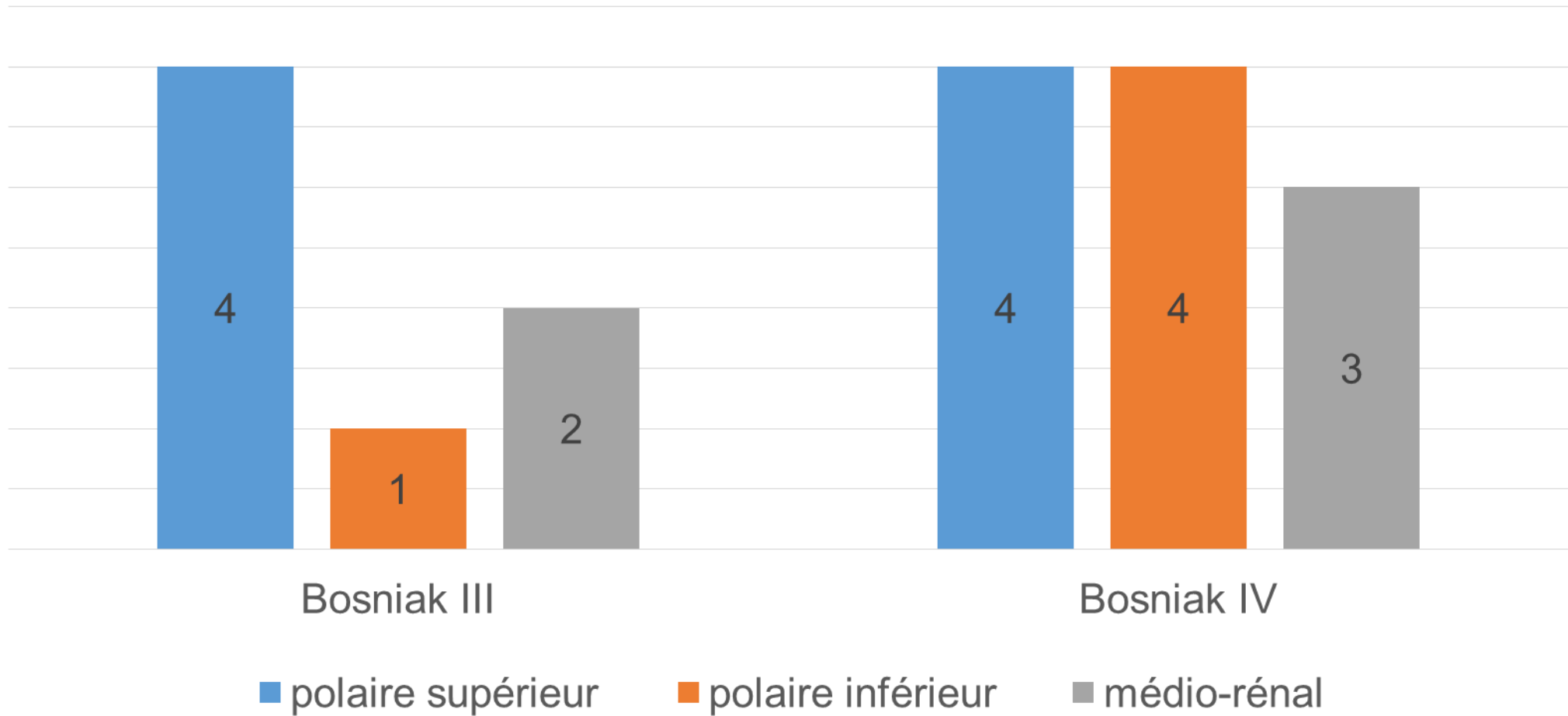
# Taux de malignité des kystes III et IV?: Étude rétrospective du service d'urologie/HCA

Répartition selon le côté atteint



# Taux de malignité des kystes III et IV?: Étude rétrospective du service d'urologie/HCA

Répartition selon le siège



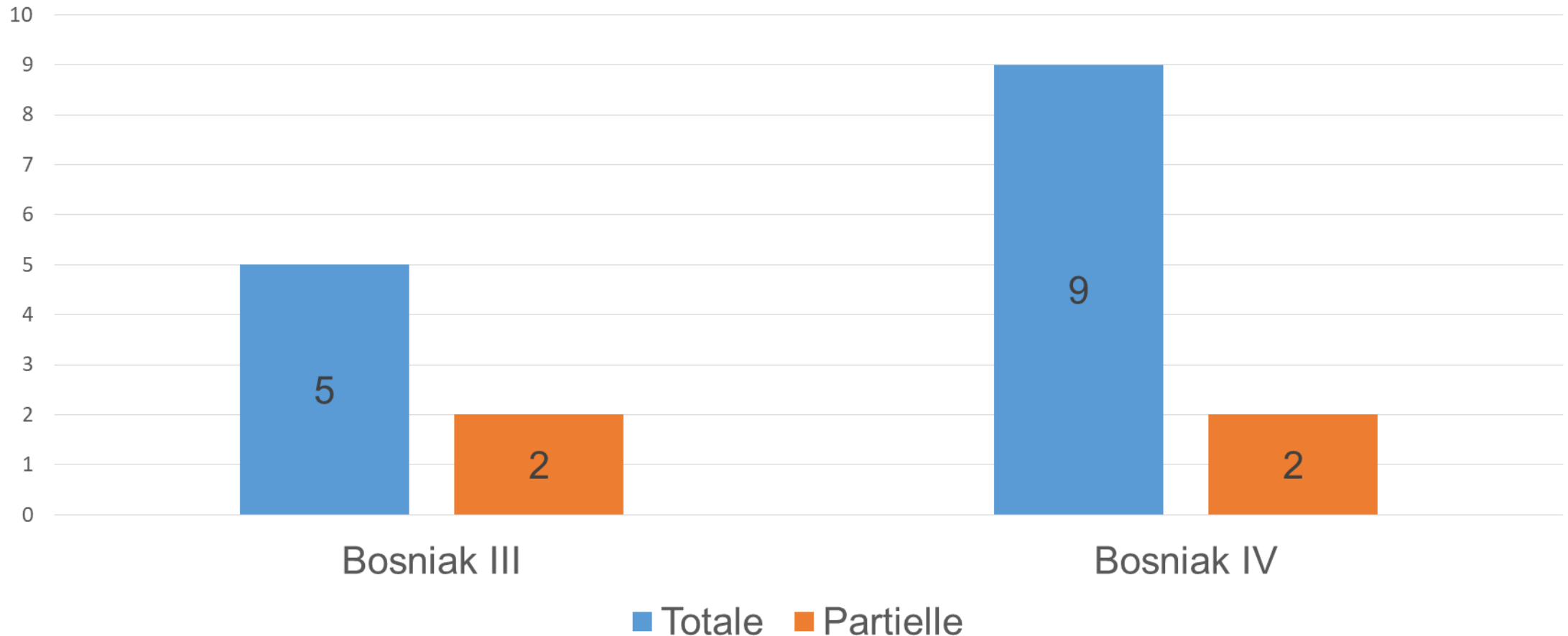
# Taux de malignité des kystes III et IV?: Étude rétrospective du service d'urologie/HCA

## Répartition selon la taille

Bosniak III	Bosniak IV
47	47
27	78
46	43
81	75
55	45
32	177
50	90
-	98
-	42
-	62
-	162
<b>48,3</b>	<b>83,5</b>

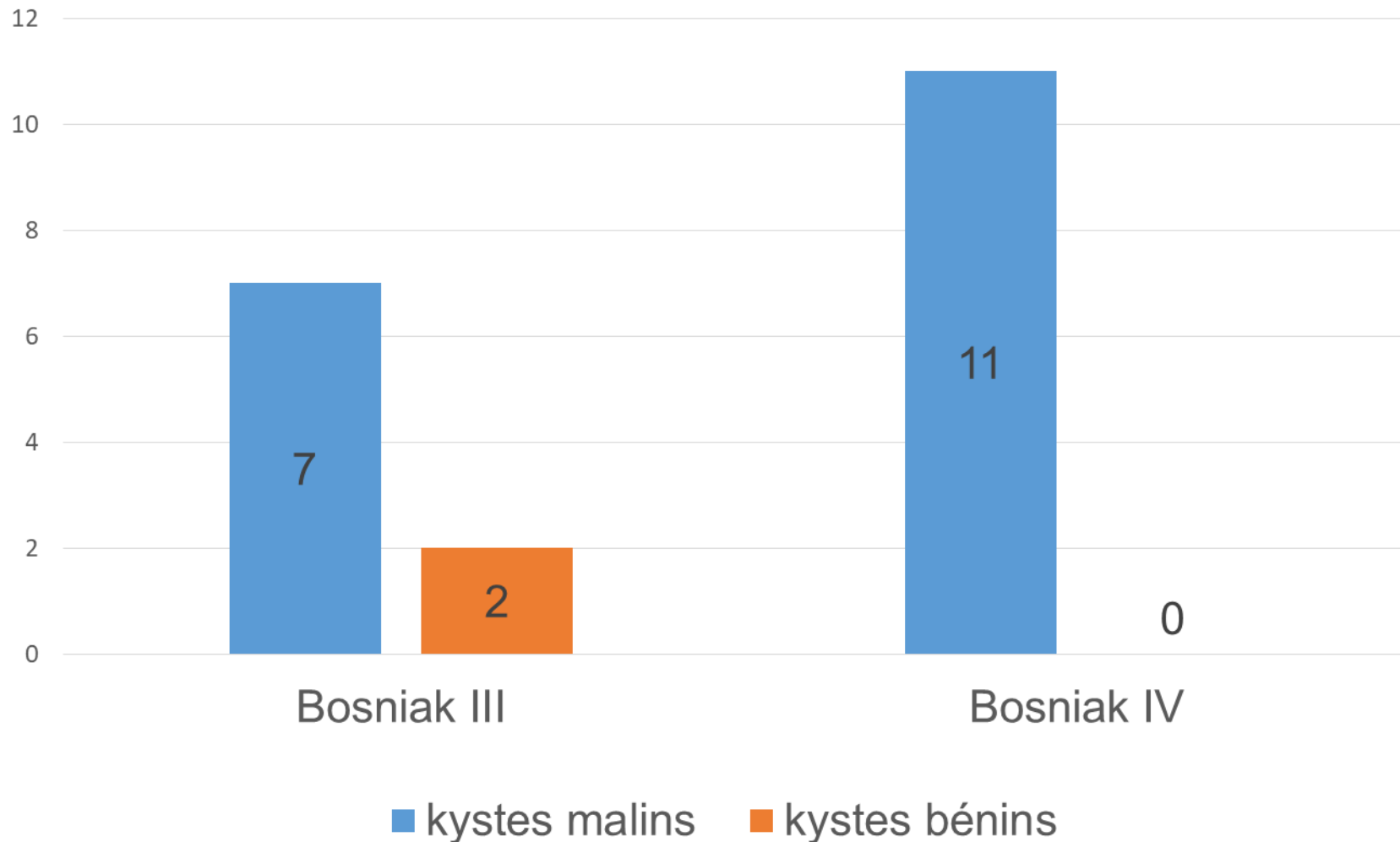
# Taux de malignité des kystes III et IV?: Étude rétrospective du service d'urologie/HCA

Répartition selon le type de néphrectomie



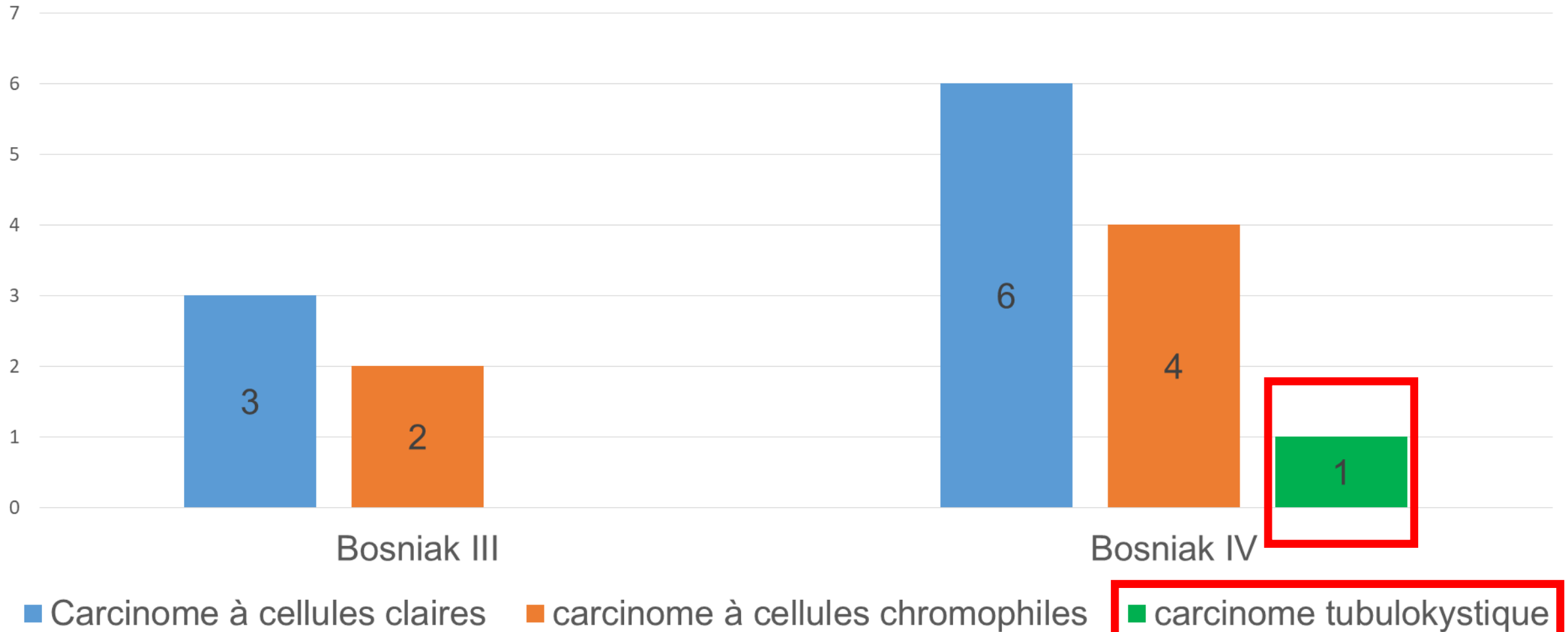
# Taux de malignité des kystes III et IV?: Étude rétrospective du service d'urologie/HCA

## Répartition selon les résultats anatomopathologiques



# Taux de malignité des kystes III et IV?: Étude rétrospective du service d'urologie/HCA

Répartition selon le type histologique des kystes malins



# Taux de malignité des kystes III et IV?:

## Revue de littérature

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 Volume 16, Number 2, March 2002  
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Laparoscopic Evaluation of Indeterminate Renal Cysts  
 Long-Term Follow-Up

JERRY LIMB, M.D., LYRIC SANTIAGO, M.D., JON KASWICK, M.D., and GARY C. BELLMAN

TABLE 1. DEMOGRAPHIC AND PERIOPERATIVE DATA OF 57 PATIENTS

Mean age (range)	53.8 (18–87)
M/F	31/26
Cyst size (cm)	
Total (range)	5.3 ± 2.3 (1.5–10)
Benign	4.1
Cystic RCC	5.6
Bosniak category, cysts	
II	28
III	29
Bosniak category, RCC	
II	3
III	8
Mean operative time (min)	
(laparoscopy only)	188
Mean EBL (mL)	
Total	144
Laparoscopy only	85
Hospital days	
Total	1.2
Laparoscopy only	0.6
Complications (patients)	3

# Taux de malignité des kystes III et IV?: Revue de littérature

*BJU International* (2000), 86, 607–609

## An evaluation of Bosniak's radiological classification of cystic renal masses

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<i>Study</i>	<i>Bosniak category (no. malignancies/no. cases)</i>			
	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>
[6]	–	0/4	4/7	5/5
[7]	0/7	4/5	4/4	6/6
[8]	0/22	1/8	5/11	26/29
[9]	1/1	1/7	4/13	5/8
<b>Present</b>	<b>0/11</b>	<b>1/2</b>	<b>10/10</b>	<b>12/12</b>
Total	1/41	7/26	27/45	54/60
% malignancy	2	27	60	90

# Taux de malignité des kystes III et IV?: Revue de littérature

## Cystic Renal Masses: Accurate Bosniak Classification Requires Adequate Renal CT

Nancy S. Curry<sup>1</sup>  
Sachiko T. Cochran<sup>2</sup>  
Nabil K. Bissada<sup>3</sup>

**OBJECTIVE.** The objective of this study was to assess the practical usefulness of the Bosniak classification system for separating surgical from nonsurgical cystic renal masses in a large number of patients examined with properly performed renal CT. The study included only patients whose scans were technically adequate to allow proper assignment of the lesion to a category.

**MATERIALS AND METHODS.** The scans of 109 patients were gathered from two large teaching institutions both prospectively and retrospectively, yielding a total of 116 analyzable renal cystic lesions. Eighty-two masses were resected from 77 of these patients, retrospectively categorized by two experienced urologists using the Bosniak classification system, and correlated with pathology reports. A second group of 34 lesions in 32 patients with atypical cysts was followed up prospectively for periods ranging from 3 months to 10 years.

**RESULTS.** The results were similar for the two institutions: 15 resected categories I and II lesions were correctly identified as benign, and all 18 category IV lesions were malignant. Twenty-nine (59%) of 49 pooled category III masses were malignant. No malignancies have been identified in the prospectively monitored group of patients.

**CONCLUSION.** Our results are compared with earlier, smaller series and support those that show that the Bosniak classification system is useful in separating lesions requiring surgery from those that can be safely followed up, provided proper CT techniques are used.

**A** typical cystic renal mass is frequently encountered in daily radiology practice, and the management of these lesions remains a subject of some controversy. A classification system based on specific CT features has been advocated by Morton A. Bosniak to separate lesions requiring surgery from those that can be safely followed up [1-4]. Only a small number of investigators have looked at outcomes from applying the Bosniak classification system, and those studies show various degrees of success [5-9]. No controlled studies have been performed to optimize the categorization process by assuring that the CT techniques used are appropriate. The objective of our study was to reassess the practical usefulness of the Bosniak classification system for separating surgical from nonsurgical cystic renal masses in a large number of patients evaluated with proper renal CT technique.

**Materials and Methods**

From 1990, CT scans showing atypical cystic renal masses were collected from two tertiary referral

teaching institutions. These scans represented surgical and nonsurgical cases. Scans of 113 patients were collected prospectively and retrospectively from 1990 to 1998, and another 11 were retrieved from teaching file material before 1990. All 124 cases were analyzed retrospectively to determine how effective the Bosniak classification system is in separating surgical from nonsurgical lesions. Cases were included only if their potential for partial volume averaging inaccuracy was minimized by collimation of less than or equal to half the diameter of the lesion. Ultimately, the scans from 109 patients with 116 analyzable lesions were reviewed. The patients came from the two institutions, with one institution accounting for 66% of the studied population. The pooled patient population was composed of 60 men and 29 women.

Eighty (73%) of the 109 patients underwent dedicated renal CT studies with imaging of the kidneys performed both before and after the IV injection of contrast material. Fifty-one (59%) of the 58 categories II and III patients were examined with dedicated renal studies. Howardfield unit measurements were obtained on the lesions on both sets of scans. Section thickness varied from 3 to 10 mm, and collimation was 7 mm or less in 54% of the patients

Category	No.	Benign	Malignant
I	4	4	0
II	11	11	0
III	49	20	29 (59)
IV	18	0	18 (100)
<b>Total</b>	<b>82</b>	<b>35</b>	<b>47 (57)</b>

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Presented at the annual meeting of the American Roentgen Ray Society, New Orleans, May 1999.  
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# Taux de malignité des kystes III et IV?: Revue de littérature

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## Physiology/Medical Disease

### LAPAROSCOPIC PARTIAL NEPHRECTOMY FOR CYSTIC MASSES

MASSIMILIANO SPALIVIERO, BRIAN R. HERTS,\* CRISTINA MAGI-GALLUZZI, MENG XU,  
MIHIR M. DESAI, JIHAD H. KAOUK, KAY TUCKER, ANDREW P. STEINBERG  
AND INDERRIR S. GILL.†‡

TABLE 3. *RCC in group 1 renal cystic lesions stratified by Bosniak classification*

CT Diagnosis	No. Pts (%)	CT Median Cyst Size (cm)	No. RCC on Pathology Findings (%)	Fuhrman Grade (No.)
Bosniak I	1 (2)	4	1 (100)	I
Bosniak II	9 (18)	2.6	2 (22)	I in 1, II in 1, benign in 7
Bosniak IIF	4 (8)	3.7	1 (25)	I in 1, benign in 3
Bosniak III	12 (24)	3.2	6 (50)	I in 1, II in 4, III in 1, benign in 6
Bosniak IV	21 (42)	2.8	19 (90)	II in 17, III in 2, benign in 2
Heterogeneous mass*	3 (6)	3.5	3 (100)	II in 1, III in 1, not available in 1
Totals	50 (100)	3.0	32 (64)	

# Taux de malignité des kystes III et IV?:

## Revue de littérature

### Differential Diagnosis of Complex Cystic Renal Mass Using Multiphase Computerized Tomography

Cheryn Song, Gyeong Eun Min, Kanghyon Song, Jeong Kon Kim, Bumsik Hong, Choung-Soo Kim and Hanjong Ahn\*

*From the Departments of Urology and Radiology, University of Ulsan College of Medicine, Asan Medical Center, Seoul and Seoul National University Bundang Hospital, Seongnam, Korea*

Bosniak Class	No. Pts (%)	No. Surgical Procedures (%)		No. Malignant Pathology (%)
		Cyst Excision	Partial/Radical Nephrectomy	
II	26 (25.0)	13 (48.3)	13 (51.7)	3 (10.3)
II-F	3 (2.9)	1 (33.3)	2 (66.7)	0
III	38 (36.5)	4 (10.5)	34 (89.5)	21 (55.3)
IV	37 (35.6)	1 (2.7)	36 (97.3)	32 (86.5)
Totals	104	19 (18.3)	85 (51.7)	56 (53.8)

# CONCLUSION

Les résultats de notre étude montrent que la classification de Bosniak est utile dans la prédiction de la malignité des lésions kystiques du rein.

**MERCI POUR VOTRE ATTENTION**

