





# Benign Lesions Detected in Patients Undergoing Nephrectomy for Renal Mass: Single Center Experiences

## Renal Kitle Tanısı ile Operasyon Yapılan Hastalarda Saptanan Benign Lezyonlar: Tek Merkez Deneyimi

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**ABSTRACT Objective:** Lesions with benign features might be detected in some of the patients who undergo surgery with re-diagnosis of renal tumor. In our study, we aimed to evaluate the patients who underwent nephrectomy with various methods and whose histopathological examination results were benign. **Material and Methods:** A total of 203 patients who underwent partial or radical nephrectomy due to diagnosis of renal masses between April 2015 and December 2018 and followed-up regularly in our clinic were evaluated retrospectively. The nephrectomy operations were performed using open, laparoscopic or robot-assisted laparoscopic methods. Demographic data, radiological findings, surgical methods, histopathological data, follow-up periods and recurrence status were recorded as patient characteristics. **Results:** The mean age and body mass index (BMI) of the patients were  $56.7 \pm 12.3$ /year and  $27.9 \pm 4.2$ /kg/m<sup>2</sup>, respectively. In the preoperative evaluation, American Society of Anesthesiologist (ASA) II (139 [68.4%] score and T1a (87 [48.3%]) staging were most commonly seen in the study. Benign pathology was detected histopathologically in 22 (10.8%) patients. These lesions were oncocytoma in 7 (3.4%) patients, angiomyolipoma in 9 (4.4%) patients, simple cyst in 3 (1.4%) patients, chronic interstitial nephritis in 2 (0.9%) patients and hydatid cyst in 1 (0.4%) patient, respectively. Recurrent lesions occurred in 4 (1.9%) patients during the mean follow-up period of 19.3 months. **Conclusion:** Benign lesions in renal masses after nephrectomy are encountered despite recent advances in imaging techniques. Clinical evaluation of radiologically suspected lesions should be performed well and additional diagnostic methods should be applied.

**Keywords:** Carcinoma, renal cell; nephrectomy; kidney neoplasms

**ÖZET Amaç:** Böbrek tümörü ön tanısı ile cerrahi uygulanan hastaların bir bölümünde benign özelliklere sahip olan lezyonlar tespit edilmektedir. Biz de çalışmamızda kliniğimizde çeşitli yöntemlerle nefrektomi yapılan ve histopatolojik incelemeleri benign olarak sonuçlanan hastaların değerlendirilmesini amaçladık. **Gereç ve Yöntemler:** Kliniğimizde Nisan 2015 ve Aralık 2018 yılları arasında renal kitle nedeniyle parsiyel veya radikal nefrektomi yapılan ve düzenli takip edilen 203 hasta retrospektif olarak değerlendirildi. Hastaların nefrektomi operasyonları açık, laparoskopik veya robotik olarak gerçekleştirildi. Hastaların tanı yaşı, demografik verileri, radyolojik bulguları, uygulanan cerrahi yöntemler, histopatolojik verileri, takip süreleri ve nüks durumları kayıt edildi. **Bulgular:** Hastaların ortalama yaş değerleri ve beden kitle indeksleri (BKİ) sırasıyla  $56,7 \pm 12,3$ /yıl ve  $27,9 \pm 4,2$ /kg/m<sup>2</sup> olarak bulundu. Operasyon öncesi değerlendirmede hastaların çoğunluğunun Amerikan Anesteziyoloji Derneği (ASA) II (139 [%68,4] olduğu ve T1a (87 [%48,3]) evrelemeye sahip oldukları belirlendi. Operasyon sonrası yapılan histopatolojik değerlendirmede 22 (%10,8) hasta benign patolojiye sahipti. Bu lezyonlar sırasıyla 7 (%3,4) hastada onkositom, 9 (%4,4) hastada anjiomyolipom, 3 (%1,4) hastada basit kist, 2 (%0,9) hastada kronik interstisyel nefrit ve 1 (%0,4) hastada kist hidatik olarak belirlendi. Ortalama 19,3 aylık takip sürecinde operasyon sonrası sadece 4 (%1,9) hastada nüks lezyon gözlemlendi. **Sonuç:** Son yıllarda görüntüleme yöntemlerindeki gelişmelere rağmen renal kitlelerde nefrektomi sonrası benign lezyonlarla karşılaşabilmekteyiz. Bu nedenle radyolojik olarak şüpheli lezyonlarda klinik değerlendirme iyi yapılmalı ve ek tanı yöntemlerine başvurulmalıdır.

**Anahtar Kelimeler:** Karsinom, renal hücreli; nefrektomi; böbrek neoplazileri

Renal tumors are generally asymptomatic and the incidence has increased in recent years because of incidentally diagnosis with radiological examinations.<sup>1</sup> Flank pain, macroscopic hematuria and abdominal mass triad is observed in only 6-10% of the patients and these symptoms are generally related to progressive disease or aggressive histological subtype.<sup>2</sup> Despite the recent developments in the imaging methods are still insufficient for the distinctive diagnosis of renal masses and the final results were reached with the histopathological analysis. Fat-poor renal angiomyolipoma (AML) and oncocytoma are the best examples that these lesions may have similar radiological findings in distinguishing between benign and malignant neoplasms. Consequently unnecessary surgical procedures could be applied due to most benign lesions are regarded as malign.<sup>3</sup> The objective of our study was to determine the results of the patients who were applied surgical treatment for renal mass in our clinic through a retrospective evaluation.

## MATERIAL AND METHODS

Between April 2015 and December 2018, a total of 203 patients were evaluated retrospectively who had partial nephrectomy (PN) and radical nephrectomy (RN) with malign renal mass pre-diagnosis in our clinic. Demographic features, mass size, location, surgical treatment methods, histopathological results, follow-up durations and recurrence status were recorded as patient characteristics. Patients were evaluated through physical examination, laboratory tests, anteroposterior chest radiographs, computed tomography (CT) and magnetic resonance imaging (MRI) before the surgery. Patients who were diagnosed based on pre-operative biopsy reports and applied cytoreductive nephrectomy were excluded from the study. RN and PN were performed based on the surgical principles as defined. The tumors were classified and graded according to the 2010 tumor, lymph node, metastasis (TNM) staging system and 2004 World Health Organization (WHO).<sup>4,5</sup> The study has been approved by the ethics committee of the institution and it conforms to the provisions of the Declaration of Helsinki (T.C Health Sciences University Bakirkoy

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## RESULTS

Demographic data of the patients were summarized in Table 1. The mean age of 203 patients [122 (60%) male and 81 (39.9%) female] patients were detected as 56.7±12.3 years. According to American Society of Anesthesiologists (ASA) scorings, it was observed that 16 patients (7.8%) had ASA 1, 139 (68.4%) had ASA 2, 47 (23.1%) patients had ASA 3 and 1 patient (0.4%) had ASA 4 risk score. It was determined that 97 (47.7%) patients had right, 105 (51.7%) had left and 1 (0.4%) patient had bilateral renal mass. Contrast-enhanced CT was performed in 82 (40.3%) patients and MRI was performed in 121 (59.6%) patients who had suspected lesions for the diagnosis. According to preoperative clinical staging, 87

**TABLE 1:** Demographic and radiological characteristics of the patients.

Age (years)	56.7±12.3
<b>Gender, n (%)</b>	
Male	122 (60)
Female	81 (39.9)
BMI (kg/m <sup>2</sup> )	27.9±4.2
<b>ASA score, n (%)</b>	
1	16 (7.8)
2	139 (68.4)
3	47 (23.1)
4	1 (0.4)
<b>Pre-operative screening, n (%)</b>	
CT	82 (40.3)
MRI	121 (59.6)
<b>Side, n (%)</b>	
Right	97 (47.7)
Left	105 (51.7)
Bilateral	1 (0.4)
<b>Pre-operative T stage, n (%)</b>	
T1a	87 (48.3)
T1b	57 (31.6)
T2a	29 (14.2)
T2b	18 (8.8)
T3a	5 (2.7)
T3b	7 (3.4)

BMI: Body mass index; CT: Computed tomography; MRI: Magnetic resonance imaging.

(48.3%) patients had T1a, 57 (31.6%) had T1b, 29 (14.2%) had T2a, 18 (8.8%) had T2b, 5 (2.7%) had T3a and 7 had T3b renal masses. Based on the operation type, 72 (35.4%) patients underwent open radical nephrectomy, 65 (32%) patients underwent open partial nephrectomy, 35 (17.2%) patients underwent laparoscopic radical nephrectomy, 17 (8.3%) patients underwent laparoscopic partial nephrectomy, 5 (2.4%) patients underwent robot-assisted laparoscopic radical nephrectomy and 9 (4.4%) patients underwent robot-assisted laparoscopic partial nephrectomy. The mean renal ischemia time was  $16.2\pm 6.6$  min. In the 203 patients, 22 (10.8%) tumors were benign, including, 9 (4.4%) angiomyolipoma, 7 (3.4%) oncocytoma, 3 (1.4%) simple cyst, 2 (0.9%) chronic interstitial nephritis and 1 (0.4%) hydatid cyst. Pathological staging and fuhrman grading of patients who have renal cell carcinoma were presented in Table 2. Recurrence of disease occurred in only 4 patients (1.9%) during a mean follow-up period of  $19.3\pm 9.3$  months.

## DISCUSSION

The total number of newly diagnosed renal cancer was estimated as 400.000 in 2018 and this finding represents nearly 4% of all newly diagnosed malignities. Also renal cancers are the 9<sup>th</sup> most common cancer in males and the 14<sup>th</sup> in females around the world. Small, localized, incidental renal masses detected due to the increased use of imaging methods increase incidence of renal cell carcinoma (RCC) and this rate constitutes approximately half of new RCC case.<sup>6</sup> These incidentally detected asymptomatic tumors generally included low-stage tumors.<sup>7</sup> When the decrease in total renal functions occurring due to RN applied in localized and low-stage RCC in previous years is considered, PN is currently more preferred surgical techniques and its indications of use increase with the developing surgical experience and technological improvements.<sup>8</sup> Today, there is an increase in the incidence of benign lesions as in RCC.<sup>9</sup> Renal benign lesions include renal adenoma, metanephric adenoma, renal oncocytoma, nephrogenic adenofibroma, mesoblastic nephroma, capsuloma, juxtaglomerular cell tumor, medullary fibroma, cystic nephroma,

**TABLE 2:** Preoperatively and postoperatively findings.

Operation type, n (%)	
Open radical nephrectomy	72 (35.4)
Open partial nephrectomy	65 (32)
Laparoscopic radical nephrectomy	35 (17.2)
Laparoscopic partial nephrectomy	17 (8.3)
Robot-assisted laparoscopic radical nephrectomy	5 (2.4)
Robot-assisted laparoscopic partial nephrectomy	9 (4.4)
Ischemia time (min)	$16.2\pm 6.6$
Histopathological evaluation, n (%)	
Renal cell carcinoma	180 (88.6)
Transitional epithelial cell carcinoma	1 (0.4)
Oncocytoma	7 (3.4)
Angiomyolipoma	9 (4.4)
Simple cyst	3 (1.4)
Chronic interstitial nephritis	2 (0.9)
Hydatid cyst	1 (0.4)
Renal cell carcinoma sub-type, n (%)	
Clear cell type	145 (80.5)
Papillary type	17 (9.4)
Chromophobe type	11 (6.1)
Unclassified type	2 (1.1)
Rabdoid variant type	2 (1.1)
Multiloculated cystic variant type	3 (1.6)
Fuhrman degree, n (%)	
1	14 (7.7)
2	96 (53.3)
3	46 (25.5)
4	24 (13.3)
Post-operative pT stage, n (%)	
pT1a	65 (35.9)
pT1b	50 (27.6)
pT2a	18 (9.9%)
pT2b	16 (8.8%)
pT3a	19 (10.4%)
pT3b	9 (4.9%)
pT4	4 (2.2%)
Follow-up duration (months)	$19.3\pm 9.3$
Recurrence. n (%)	4 (1.9)

cystic hamartoma, AML, leiomyoma, hemangioma, lipoma, xanthogranulomatous pyelonephritis, renal cysts and fibroepithelial polyp.<sup>10</sup> Especially fat-poor AML among these lesions cannot be distinguished from malign neoplasms and is exposed to unnecessary surgical procedures although it is a benign lesion.<sup>3</sup> In article series examining the postoperative

histopathologies of renal masses which were evaluated as malign and applied surgery, it was observed that the ratio of benign pathologies changed between 8.1% and 32.6%. Patient number was limited in many of these studies and studies with more than 100 patients were summarized in Table 3.<sup>11-18</sup> In our study including 203 patients, the ratio of patients with benign pathology was detected as 10.8%.

AML was reported as the most common benign renal lesion in the histopathological examinations.<sup>19</sup> AML are formed by blood vessels, smooth muscles and fat tissue and are generally observed in female gender between 4<sup>th</sup> and 6<sup>th</sup> decades.<sup>10</sup> They should be treated in case of pain, bleeding or malignancy suspicion. Although the surgery is accepted as the treatment, alternative treatment options such as radiofrequency ablation, mTOR inhibitors (everolimus and sirolimus) can also be used in clinical practice.<sup>20</sup> The studies reported AML prevalence as 3.2%. The prevalence of AML was detected as 4.4% in also our study as compatible with literature. Oncocytoma is the second most common renal benign lesion and is mostly seen in males in the 7<sup>th</sup> decade.<sup>21</sup> It constitutes nearly 3-7% of all renal masses.<sup>22</sup> Cystic nephroma is one of the quite rare benign lesions of the kidney that are composed of stromal and epithelial components. It is similar to cystic malign pathologies in radiological terms and is reported as case presentations in literature.<sup>23</sup> Oncocytoma was found in 7 (3.4%) patients in our study and it was detected as the most common benign mass following AML concordantly

with the literature. Although xanthogranulomatous pyelonephritis which occurs quite rarely due to chronic infection and the resultant renal mass images are benign lesions, they may not always present specific radiological and clinical findings. In literature, it was stated that focal xanthogranulomatous pyelonephritis cases may have malign appearance but may also imitate a malign pathology through the formation of thrombus in renal veins.<sup>24,25</sup>

CT and MRI are used as the standard imaging methods for accurate diagnosis of renal masses. There are many retrospective studies on the prediction of RCC through MRI. Kim et al. found the sensitivity of CT and MRI in the prediction of RCC in the presence of a small renal mass as 79% and 88%, specificity as 44% and 33%, respectively.<sup>26</sup> They also stated that the diagnostic accuracy of CT and MRI was weak in subjective radiological interpretation in clinical practice.<sup>27</sup> Since needle biopsy on which there is conflicting information on its use for the diagnosis of RCC doesn't conform to oncological principles and the risk of the tumor seeding during biopsy, it is not recommended for the diagnosis of suspected renal lesions.<sup>28</sup> Other indicators which may predict the histopathology of renal masses other than the imaging methods were also covered in literature. Especially gender and age stand out among these indicators. In the study discussing these two factors stated that age and gender were not related to the histopathological analysis of renal masses.<sup>29</sup> On the other hand, Hajdu et al. showed that gender and age were predictive fac-

**TABLE 3:** Distributions of benign pathologies in nephrectomy materials.

Author	Year	Renal mass	Benign				
		number	masses (n, %)	AML (n, %)	Oncocytoma (n, %)	Cyst (n, %)	Others (n, %)
Fujii et al.	2008	176	19 (11%)	10 (5.7%)	5 (2.8%)	2 (1.1%)	1 (0.6%)
Jeon et al.	2010	376	81 (21.5%)	35 (9.3%)	11 (2.9%)	26 (6.9%)	9 (2.4%)
Kutikov et al.	2006	143	23 (16.1%)	10 (7%)	8 (5.6%)	3 (2.1%)	1 (0.7%)
Pederson et al.	2014	151	23 (15.2%)	7 (4.6%)	12 (7.9%)	NA	4 (2.6%)
McKiernan et al.	2002	291	64 (22%)	12 (4.1%)	31 (10.7%)	14(4.8%)	7 (2.4%)
Pahernik et al.	2006	504	123 (24.4%)	33 (6.5%)	53 (10.5%)	23 (4.6%)	13 (2.8%)
Marszalek et al.	2004	129	42 (32.6%)	7 (5.5%)	10 (7.8%)	18 (13.9%)	7 (5.4%)
Fujita et al.	2014	149	12 (8.1%)	5 (3.4%)	5 (3.4%)	0 (0%)	2 (1.3%)

tors and female gender and young age were mainly related to benign pathological findings and Siemer et al. showed that the incidence of benign pathologies in female gender was found two times more than males.<sup>30</sup> This finding could be once more proven that 14 out of 22 patients with benign pathology results were female in our study and this supports that benign pathology prevalence in females is two times higher than males. The possibility of high benign pathology incidence especially in young females again brings the importance of organ preserving surgery in these patients into prominence one more time.

The limitations of our study include the limited patient number, being retrospective and single centered and short patient follow-up periods.

## CONCLUSION

Serious dilemmas in the diagnosis of small renal masses continue despite the developments in imaging methods. Thus, a multidisciplinary approach mainly based on experience and knowledge is required to distinguish benign lesions. Also a good clinical evaluation should be made in suspected lesions and additional diagnosis methods should be

applied if necessary. On the other hand, our results should be supported by multi-centered studies with higher number of patients and longer follow-up period.

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### Conflict of Interest

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

### Authorship Contributions

**Idea/Concept:** Yavuz Onur Danacıoğlu, Ali İhsan Taşçı; **Design:** Yusuf Arıkan; **Control/Supervision:** Yavuz Onur Danacıoğlu; **Data Collection and/or Processing:** Deniz Noyan Özlü; **Analysis and/or Interpretation:** Ekrem Güner, Ubeyd Sungur; **Literature Review:** Ekrem Güner; **Writing the Article:** Ekrem Güner, Emre Şam; **Critical Review:** Joshgun Huseynov, Mithat Ekşi; **References and Fundings:** Mithat Ekşi; **Materials:** Joshgun Huseynov.

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