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Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 5, May 2026

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# DOES THE R.E.N.A.L. NEPHROMETRY SCORING SYSTEM AID MANAGEMENT OF A SOLID RENAL MASS

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## ABSTRACT

The purpose of this abstract is to investigate the impact of the RENAL nephrometry score system on operating time, blood loss, and intraoperative complications; the system has been suggested as a method for anatomically classifying renal masses with the aim of predicting surgical outcomes for patients undergoing either partial or radical nephrectomy.

**Patients and methods:** The 36 participants in this prospective study were enrolled at Gazi al Harreri Teaching Hospital between December 2013 and December 2015. In order to manage renal masses, classify them based on their

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radiological characteristics on MRI and CT scans, and predict the surgical outcome (partial vs. radical nephrectomy), intraoperative blood loss, hospital stay, and intraoperative complications, a renal nephrometry scoring system is utilized.

**Results:** This study included 36 patients who had radical or partial nephrectomy for renal cell carcinoma (RCC). Of them, 17 were male (47.22% of the total) and 19 were female (52.78% of the total). Of the 26 patients who had radical nephrectomy, 13 were female (36.1%) and 13 were male (36.1%). Ten patients had partial nephrectomy, including four men (11.1%) and six females (16.7%). Mild complex scores (4-6), moderate complex scores (7-9), and high complex scores (10-12) were the distribution of nephrometry scores among the sample under study. 5 instances (13.9%) had low scores, 13 cases (36.1%) had intermediate scores, and 18 cases (50.0%) had high scores. Surgery results according to nephrometry score: 10 patients had NSS, 5 had low scores (50%), 3 had moderate scores (30%), and 2 had high scores (20%). For the 26 patients that underwent RN, the results showed that 38.5% had a moderate score and 61.5% had a high score.

**Aim of study:** The purpose of this research is to examine how the RENAL nephrometry scoring system can be used to control renal masses, as well as to forecast postoperative complications, blood loss, and length of hospital stay.

**Conclusion:** For organ-confined renal malignancies, the RENAL nephrometry score was associated with intraoperative complications, EBL, LOS, and surgical prognosis. Evidence like this points to the RENAL nephrometry score as a measure of how technically challenging it is to do a full or partial nephrectomy.

**Keyword:** Renal nephrometry, radical nephrectomy, and partial nephrectomy.

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## INTRODUCTION:

### A-Over View:

Although it only accounts for 2% of all malignancies in adults, renal cell carcinoma is the most deadly of the prevalent urologic tumors, with a 5-year mortality rate of about 35%. In 2008, there were around 17.9 new cases diagnosed per 100,000 people. While most cases of kidney cancer are renal cell carcinomas, which develop as a single tumor inside a kidney, it is common for there to be several tumors in a single kidney or even in both kidneys. The American Cancer Society reports that kidney cancer rates have been steadily rising since the 1970s, with a small decline in mortality rates observed since the late 1990s. (1) Diagnosis of renal cell carcinoma typically occurs in the early 60s. Of all pediatric renal tumors, only 2.3% to 6.6% are renal cell carcinoma (RCC) in children. Concerning solid lumps in the kidneys can indicate malignancy. On average, these tumors are malignant eighty percent of the time. However, treatment is typically based on the assumption that the mass is malignant, even though approximately 20% of masses with imaging test suspicions of cancer are actually benign. Patients can usually choose from a variety of minimally invasive procedures that do not harm the kidneys. Percutaneous, computed tomography (CT)-guided mass cryoablation, robotic-assisted laparoscopic partial nephrectomy, and laparoscopic partial nephrectomy are among the therapy options available.

If the surgeon finds the situation too complex for laparoscopic management, they may recommend an open partial nephrectomy. There is a significant risk of ipsilateral kidney recurrence when using NSS to treat renal cell carcinoma (RCC). The reported rate of local recurrence ranges from 0% to 10%. The lowest incidence was observed in patients who elect to undergo NSS for low-stage tumors smaller than 4 cm in diameter. 6 and 5 are examples. Radical nephrectomy, which involves removing the entire kidney, is the preferred method of treatment for individuals diagnosed with localized renal cell carcinoma (7).It is possible to

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do a thorough initial assessment on many patients utilizing noninvasive imaging techniques. Radical nephrectomy procedures do not require renal arteriography as they formerly did. A metastatic examination should be conducted on all patients, which includes chest x-rays, abdominal CT scans, and occasionally, a bone scan. The bone scan is only needed in individuals who have bone pain or an increased serum alkaline phosphatase. Metastatic cancer patients may undergo radical nephrectomy for a few reasons: to alleviate severe local symptoms, to begin a biological response modifier treatment plan, or to remove a single metastatic lesion at the same time (7). About 85% of kidney cancers in the United States are renal parenchymal tumors, also known as renal cell carcinoma, or RCC. The other 13% are upper-tract urothelial malignancies. It has only been in the recent past that researchers have begun to understand the several subtypes of renal cell carcinoma (RCC), which originate in different regions of the nephron and exhibit different tumor biology and genetic bases. Radical nephrectomy and nephron-sparing surgery have been other significant developments in the last several decades. Partial nephrectomy is an acceptable indication for patients with renal cell carcinoma (RCC) when radical nephrectomy would leave the patient anephric and immediately require dialysis. This includes individuals whose renal cancer has spread to both kidneys or to just one healthy kidney. The second scenario can arise when one kidney has never developed, when the other kidney has already been removed, or when a benign illness causes permanent damage to the opposite kidney's ability to function. Patients with unilateral renal cell carcinoma (RCC) and a healthy kidney on the other side may also benefit from a partial nephrectomy if the healthy kidney is in any way compromised, whether due to calculus disease, chronic pyelonephritis, renal artery stenosis, ureteral reflux, diabetes, or nephrosclerosis (8). Simple enucleating, polar segmental nephrectomy, wedge resection, and transverse resection are some of the surgical options for doing partial nephrectomy in patients with cancer (9). Complete tumor excision with free margins, precise collecting system closure, careful hemostasis,

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and early vascular control are basic principles that must be adhered to in all of these techniques. Additionally, adjacent fat, fascia, and peritoneum must be used to cover or close the renal defect.

Overall response rates are still modest, despite the promise of immune-based and targeted molecular therapies, indicating that while these treatments show potential, they have not yet significantly improved patient outcomes in renal cell carcinoma (RCC). RCC is still mostly a surgical illness, and it is still seen as the paradigm of the chemo-refractory tumor (10). Even though there has been a tendency toward earlier detection, mortality rates remain high, and the incidence of RCC is gradually growing.

**Part B: Causes and potential dangers:**

Obesity and tobacco use are the two most often found risk factors for renal cell carcinoma (RCC), with a 30% and 20% share, respectively. An additional risk factor for RCC development is hypertension. The evidence suggests that dietary variables or nonsteroidal anti-inflammatory medications are not major etiologic factors in the development of renal cell carcinoma (RCC). Research has shown that consuming moderate amounts of alcohol, fruits and vegetables, and fatty fish can lower the chance of developing RCC. Occupational risk factors for RCC development do not have reliable data available, which limits our understanding of how work-related exposures may contribute to the disease's incidence. Although our knowledge of the molecular genetics of RCC has advanced significantly, there is still a strong correlation between a family history of the disease and an increased risk of developing it. Inherited types of RCC account for about 2% to 4% of cases. The tumor suppressor genes and oncogenes that contribute to the formation of both familial and sporadic types of renal cell carcinoma (RCC) have been identified, and new familial syndromes of RCC have been discovered (11).

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- C-CLASSIFICATION:
- Renal masses can be malignant, benign, or inflammatory , or they can be classified based on radiographic appearance (simple cystic, complex cystic, fatty tumors, and others ).

any renal mass that enhances with contrast material on CT by more than 15 (HU) should be considered an RCC until proved otherwise

- D- R.E.N.A.L. nephrometry:
- The RENAL system was initially described in 2009 by Kutikov and Uzzo .
- RENAL system assesses (R)adius, (E)xophytic extent, (N)nearness to the renal sinus,
- (A)nterior/- posterior location, and (L)ocation relative to the polar lines.

**The Patient and the Method**

This prospective study enrolled 36 patients who were scheduled for surgery for parenchymal renal neoplasia, which is currently being categorized as renal cell carcinoma. Their ages varied from seventeen to nineteen. As an inclusion criterion, a tumor must have remained contained within a single organ and not metastasized.

**A- Pre operative Assessment and Surgical Planning:** We considered the patient's medical history alongside their physical exam results, paying close attention to any co-morbidities that could affect their kidneys and cardiovascular system. These could include conditions like diabetes, high blood pressure, excessive smoking, coronary artery disease, and hypertension.

**B- Patients records:** The following data were collected after reviewing the medical records of all patients:

1) The variables used in epidemiology include gender and age.

Two, pre-operative imaging and standard laboratory tests.

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(3) Nephron-sparing surgery (NSS) is an alternative to radical nephrectomy that may be considered in certain cases.

Every single patient was given the following: Organ Staging Using Multiphasic Renal CT Prior to Surgery

The following is stated in table 2-1 of the Worldwide TNM staging system:

| | |
|---|---|
| **TX** | **Primary tumor cannot be assessed.** |
| **T0** | No evidence of primary tumor. |
| **T1** | Tumor ≤7.0 cm and confined to the kidney.<br>T1a : Tumor ≤4.0 cm and confined to the kidney.<br>T1b : Tumor >4.0 cm and ≤7.0 cm and confined to the kidney. |
| **T2** | Tumor >7.0 cm and confined to the kidney.<br>T2a : Tumor >7.0 cm and ≤10.0 cm and confined to the kidney.<br>T2b : Tumor >10.0 cm and confined to the kidney. |
| **T3** | Tumor extends into major veins or perinephric tissues but not into the ipsilateral adrenal gland and not beyond the Gerota's fascia.<br>T3a : Tumor grossly extends into the renal vein or its segmental (muscle containing) branches or tumor invades perirenal &/or renal sinus fat but not beyond the Gerota's fascia.<br>T3b : Tumor grossly extends into the vena cava below the diaphragm.<br>T3c : Tumor grossly extends into the vena cava above the diaphragm or invades the wall of the vena cava. |
| **T4** | Tumor invades beyond the Gerota's fascia (including contiguous Extension into the ipsilateral adrenal gland). |
| **N** | : Regional Lymph Nodes<br>NX : Regional lymph nodes cannot be assess.<br>N0 : No regional lymph nodes metastasis.<br>N1 : Metastasis in regional lymph node(s). |
| **M** | : Distant Metastases<br>MX : Distant metastasis cannot be assessed.<br>M0 : No distant metastasis.<br>M1 : Distant metastasis present. |
| **Stage Grouping**<br>**Stage I: T1 N0 M0**<br>**Stage II: T2 N0 M0**<br>**Stage III: T3 Any N M0**<br>**T1 or T2 N1 M0**<br>**Stage IV: T4 Any N M0**<br>**Any T Any N M1** | |

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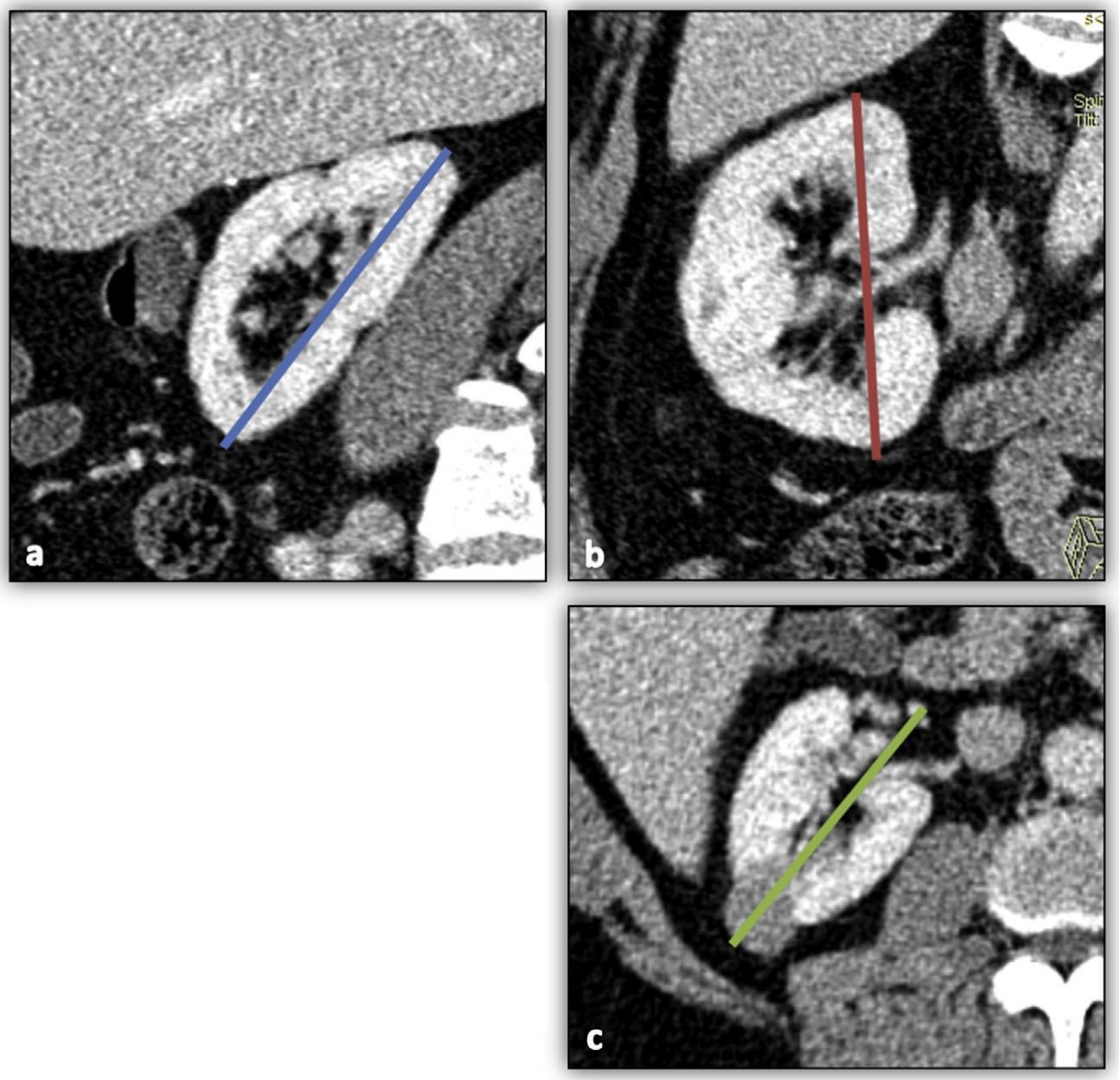
- With assessment of the renal tumors by RENAL scoring system and
- assigned a nephrometry score as follows:
- 1. Kidney is aligned into its sagittal, axial and coronal Planes which are different from the orthogonal planes of the body.



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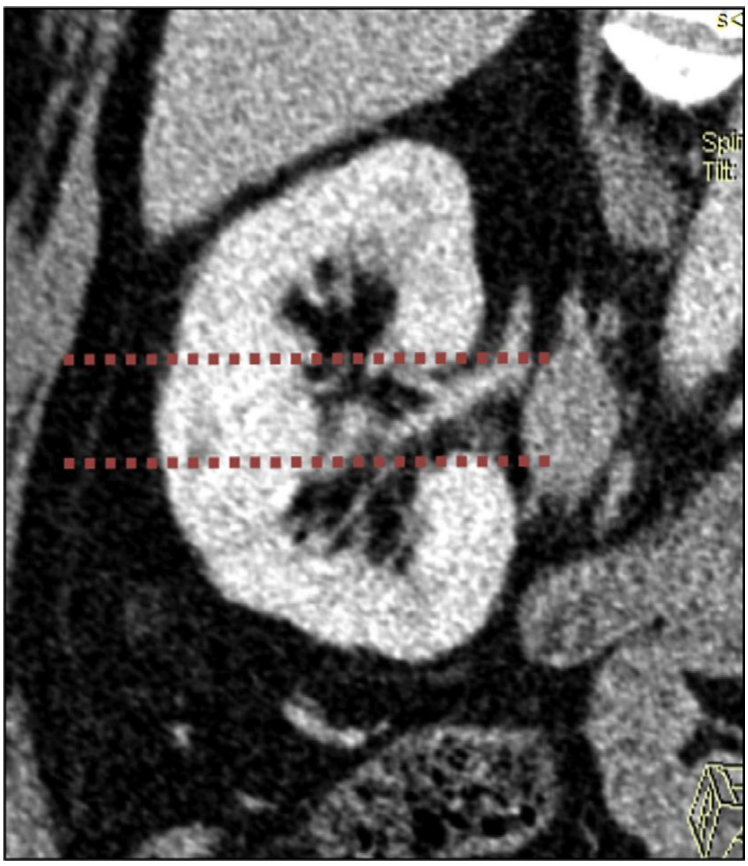
. Polar lines are assigned in the coronal plane of the kidney, pass in the axial plane and intersect the lips of the hilum.



- 3. Maximal diameter in cm (Radius): tumor will be assigned one point if its
- maximal diameter is equal to or less than 4 cm. Two points if between 4 and 7 cm and three points if equal to or more than 7 cm.
- 4. Exophytic component of the mass: tumor will be assigned one point if at least half of it is exophytic,
- two points if less than its half is exophytic,
- and three points if all the mass is completely entophytic .

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## II. Surgical excision

Based on the patient's preoperative radiological tests and their specific R.E.N.A.L. nephrometry score, the operating surgeons will determine whether to do a radical nephrectomy or a nephron-sparing treatment to remove the renal tumor. The frontal subcostal approach is used to make an incision in the abdomen for the surgery. The kidney is delicately identified in the perirenal fat after a radical nephrectomy, and the renal arteries and veins are ligated one by one. Once the kidney is removed from the perirenal fat, the fat above the tumor stays put if the patient has had a partial nephrectomy. When vascular management is necessary, the veins and arteries of the kidneys are loosely encircled by loops.

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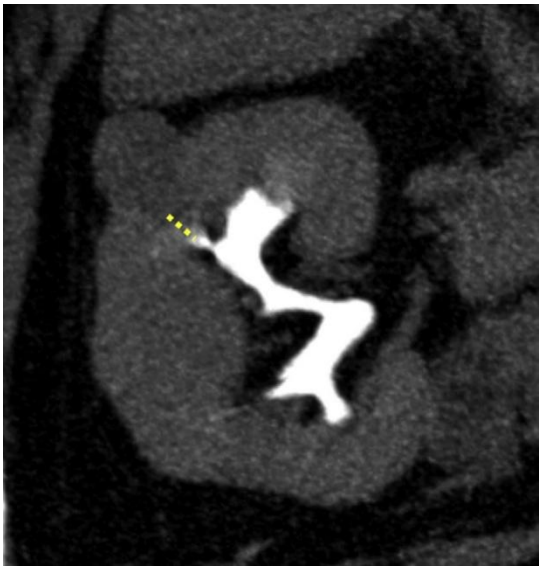
The patient was given 100 cc of 20% mannitol five to ten minutes .before the renal pedicle clamping. Hilar clamping and cold ischemia were used to treat moderately challenging lesions; the duration of cold ischemia was shorter than 35 minutes. Additionally, non-clamping partial nephrectomy was executed for small, less complicated lesions. In all cases involving partial nephrectomy, a frozen section is supplied after the aforementioned renal mass removal procedures: simple enucleation, polar segmental nephrectomy, wedge resection, and transverse resection. It usually takes around twenty to twenty-five minutes to obtain the outcome. The operation is deemed a success if the frozen section finding does not reveal the presence of the tumor. Foam coverings or parenteral approximations, such as Gerota's or Gel, are used to seal the parenteral deficiency. The following information was gathered for both open and closed nephrectomy procedures: time spent operating, blood loss during surgery, problems during surgery (vascular injury, intestinal injury), and length of time spent in the hospital after surgery.

Patients' nephrometry scores are correlated with the kind of operation (III) when appropriate statistical tests are used.



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From 4 to 6 points, moderate complexity lesions; 7 to 9 points; and 10 to 12 points were assigned to each renal tumor according to the nephrometry scoring system (R.E.N.A.L. for Radius of tumor, Exophytic/Endophytic, Nearness to collecting system or sinus, Anterior or posterior, and Location relative to the polar line) (table 2-2). In this way, all renal tumors were classified into three groups. (5) Fig.

| | 1pt. | 2pt.s | 3pt.s |
|---|---|---|---|
| **(R)adius (maximal diameter in cm)** | <4 | > 4 but <7 | >7 |
| **(E)xophytic/ endophytic** | >50% | <50% | Entirely endophytic |
| **(N)earness of the tumor to the collecting system or sinus in (mm)** | >7 | >4 but <7 | <4 |
| **(A)nterior/posterior** | No point | given | |
| **(L)ocation relative to the polar lines. Suffix (h) assigned if the tumor touches the main renal artery or vein** | Entirely above the upper or below the lower polar lines | Lesion crossing polar lines | >50% of mass across polar lines(a) or mass cross the axial renal midline(b) or mass entirely between the polar lines(c) |

## IV- Data entry and statistical analysis

The Statistical Package for the Social Sciences, an acronym for "SPSS," was used to input and analyze the data. Continuous data were displayed as the mean ± SD, while discrete variables were shown as a percentage. We used a chi-square test

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(or a Fisher exact test, when relevant) to find out if each discrete variable had a statistically significant connection. Applying one-way ANOVA allows one to ascertain the significance of a correlation between two continuous variables. We used regression analysis to make predictions based on those variables. A p-value of less than 0.05 was considered statistically significant.

**RESULTS:**

A total of 36 patients (17 men, 47.22%; 19 women 52.78%) who underwent radical and partial nephrectomy for RCC were enrolled from Ghazi al harreri teaching hospital as shown in figure 3-1.

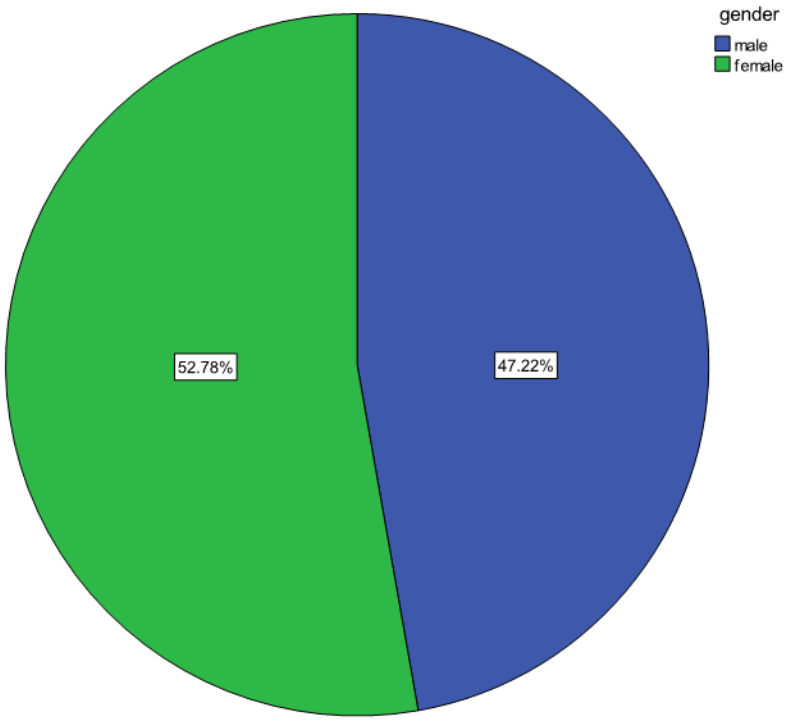


Figure 3- 1 gender distribution of the studied sample.

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Patients who underwent radical nephrectomy 26 cases, 13 female (36.1%), 13 male (36.1%).
Patients underwent partial nephrectomy 10 cases, 6 females (16.7%) , 4 males (11.1%) ,( table 3-1).

Table 3-1 outcome distribution of the studied sample according to gender

| Variables | | | No. | % |
|---|---|---|---|---|
| outcome | radical | male | 13 | 36.1 |
| | | female | 13 | 36.1 |
| | partial | male | 4 | 11.1 |
| | | female | 6 | 16.7 |
| Total | | | 36 | 100 |

The mean age distribution of patients 58.0 years, with minimum was 15 years, and maximum was 72 years. Table 3-2 Age of distribution.

| variable | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Age | 36 | 15 | 72 | 58.00 | 11.255 |

The age distribution of the studied sample show more than half patients(52.8%) were above 60 of age‖ common occurance at this age‖ ,with 33.3% of patients were between 45-60 year ,and 11.1% of cases was between 31-45 ,and 2.8% of cases was below 30 year.(figure 3-2)

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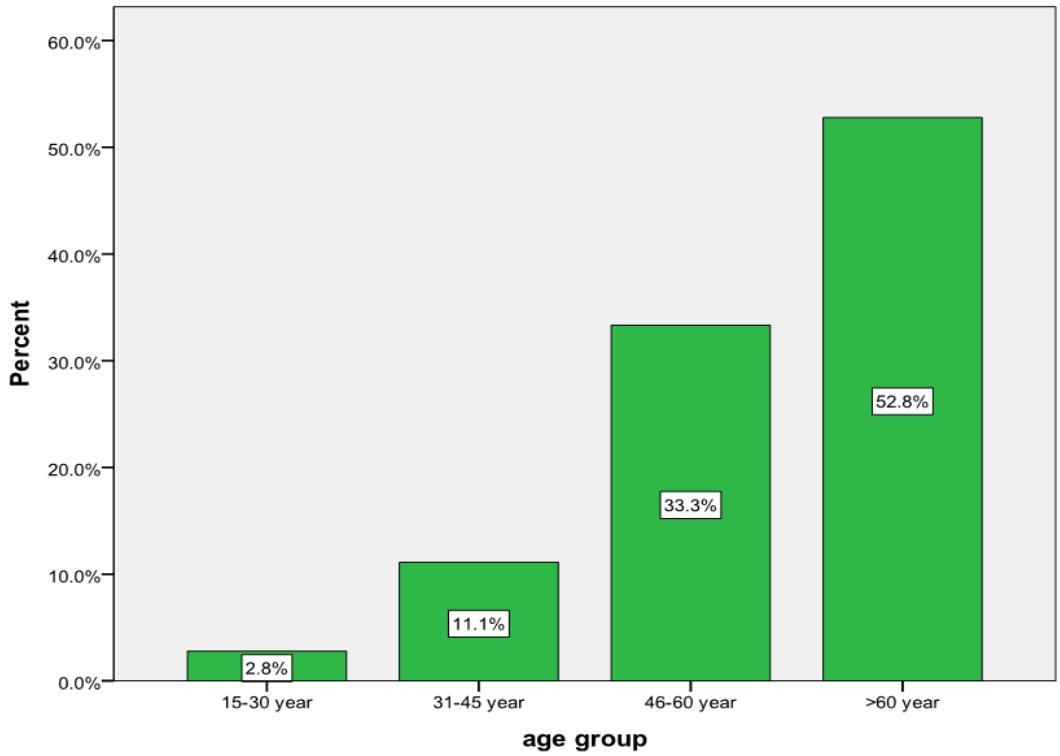


Figure3-2 age group distribution of the studied sample.

The nephrometry score distribution among the studied sample ranged from mild complex score (4-6) , moderate complex score (7-9) , high complex score (10-12) . with low score of 5 cases (13.9%) , moderate score 13 cases (36.1%) ,high score 18 cases (50.0%) , (table 3-3).

Table 3-3 Nephrometry score group distribution of the studied sample.

| Variable | | No. | % |
|---|---|---|---|
| Nephrometry scoring group | low | 5 | 13.9 |
| | medium | 13 | 36.1 |
| | high | 18 | 50.0 |
| Total | | 36 | 100.0 |

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The outcome of surgery in regard to the nephrometry score show that ,10 patients underwent NSS ,5 of which had low score(50%) , 3 with moderate score (30%) , 2 with high score (20%).

26 patients underwent RN, 10 had moderate score (38.5%), 16 cases had high score (61.5%).as shown in (table 3-4)

Table3- 4 the relationship of Nephrometry Score group with outcome in the studied sample.

| variables | | outcome | | | | p-value |
|---|---|---|---|---|---|---|
| | | radical | | partial | | |
| | | No. | % | No. | % | |
| Nephrometry scoring group | low | 0 | .0 | 5 | 50.0 | 0.001 |
| | medium | 10 | 38.5 | 3 | 30.0 | |
| | high | 16 | 61.5 | 2 | 20.0 | |
| total | | 26 | 100.0 | 10 | 100.0 | |

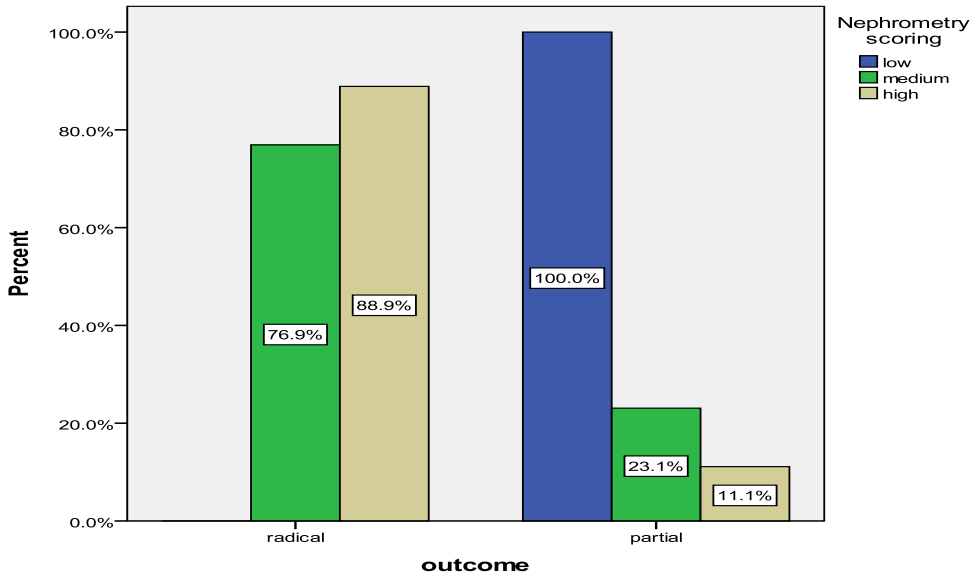


figure 3-3.

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Figure 3-3 The distribution of NSS and RN. Hospitalization taken into account with the mean hospitalization of days for low score 4.60 days ,and mean for moderate score of 3.69 days ,and for high score was 4.28 days ,(table 3-5).

Table3- 5 difference in hospitalization according to nephrometry score (NS).

| Nephrometry scoring group | N | Mean min | Std. Deviation | p-value |
|---|---|---|---|---|
| **low** | 5 | 192 | 0.273 | 0.077 |
| **medium** | 13 | 170.4 | 0.375 | |
| **high** | 18 | 187.2 | 0.208 | |

Intraoperative complication occurred in 7 of 36 cases all occurred with high score nehrometry ,,with 2 cases had bowel injury repaired intraoperativly by general surgery team ,and 2 cases of vascular injury repaired intraoperativly by vascular team ,and 2 cases of simple liver and spleenic injury (adhesion) managed intraopertively ,and 1 case with plueral inj. (table 3-6).

Table3-6 the relationship of Nephrometry scoring group with intraoperative complication in the studied sample.

| variables | | outcome | | | | p-value |
|---|---|---|---|---|---|---|
| | | radical | | partial | | |
| | | No. | % | No. | % | |
| **radius** | 1 | 0 | 0 | 3 | 30 | 0.002 |
| | 2 | 7 | 26.9 | 5 | 50 | |
| | 3 | 19 | 73.1 | 2 | 20 | |
| **total** | | 26 | 100 | 10 | 100 | |
| **Mean R** | | | 2.7 | | 1.9 | |

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The estimated blood loss (EBL) according to the nephrometry score with mean EBL of 315.0 cc for low score ,and 265.38 cc for moderate score ,and 294.44 cc for high score as shown in table 3-7.

Table3- 7 difference of (EBL) according to Nephrometry scoring group .

| Nephrometry scoring group | N | Mean | Std. Deviation | p-value |
|---|---|---|---|---|
| **low** | 5 | 315.00 | 22.36 | 0.016 |
| **Medium** | 13 | 265.38 | 37.55 | |
| **high** | 18 | 294.44 | 33.82 | |

Operative time calculated in respect to their nephrometry score ,a mean of (192 min.) for low score, and (170.4 min) for moderate score, and for high score (187.2 min) ,(table 3-8) .

Table3-8 difference in time of operation according to Nephrometry scoring group.

| Nephrometry scoring group | N | Mean min | Std. Deviation | p-value |
|---|---|---|---|---|
| **low** | **5** | **192** | **0.273** | **0.077** |
| **medium** | **13** | **170.4** | **0.375** | |
| **high** | **18** | **187.2** | **0.208** | |

The frequency of R.C.C.that was N1 ( > 7 mm from collecting system) 8 cases (22.22%) , and with N2(4-7 mm) was 12 cases (33.33%) , and N3 (< 4 mm from collecting system) was 16 cases (44.44%) of total no. of cases. With a mean N of 1.2 mm for PN, and mean N= 2.6 mm for RN. As shown in table 3- 9.

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Table 3- 9 the relationship of nearness (N) with outcome in the studied sample.

| variables | | outcome | | | | p-value |
|---|---|---|---|---|---|---|
| | | radical | | partial | | |
| | | No. | % | No. | % | |
| **Nearness (N)** | 1 | 0 | 0 | 8 | 80 | 0.001 |
| | 2 | 10 | 38.5 | 2 | 20 | |
| | 3 | 16 | 61.5 | 0 | 0 | |
| **total** | | 26 | 100.0 | 10 | 100.0 | |
| **Mean N** | | | 2.6 | | 1.2 | |

Another parameter taken into account size of mass (R) ,patients with R1 3 cases (8.3%) ,pt. with R2 12 cases (33.33%) ,and R3 21cases (58.33%) of total cases . and mean of R=1.9 for PN ,and mean R=2.7 for RN . As shown in table3- 10.

Table 3-10 the relationship of Radius with outcome in the studied sample.

| variables | | outcome | | | | p-value |
|---|---|---|---|---|---|---|
| | | radical | | partial | | |
| | | No. | % | No. | % | |
| **Nearness (N)** | 1 | 0 | 0 | 8 | 80 | 0.001 |
| | 2 | 10 | 38.5 | 2 | 20 | |
| | 3 | 16 | 61.5 | 0 | 0 | |
| **total** | | 26 | 100.0 | 10 | 100.0 | |
| **Mean N** | | | 2.6 | | 1.2 | |

## DISCUSSION:

To evaluate the possibility of nephron-sparing for localized renal tumors, Kutikov and Uzzo originally described the RENAL nephrometry scoring system in 2009. The system takes into account the tumor radius, exophytic extent, proximity to the renal sinus, anterior/posterior location, and location relative to the pole. (14)

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On the other hand, contemporary research has employed the RENAL nephrometry scoring system to forecast tumor upgrading from surgical specimens to core biopsies (15), to compare the perioperative results of robotic and laparoscopic partial nephrectomy (16), and to forecast complications (17) following partial nephrectomy (17).Most kidney tumors are now discovered accidentally at a lesser size and earlier stage, thanks to the extensive use of radiologic imaging methods. (number one).Assuming the surgery is physically viable, PN has replaced other methods as the preferred method for treating T1a renal tumors (<4 cm), and it can also be used to treat T1b renal tumors (4–7 cm). Partial nephrectomy is currently preferable over radical nephrectomy for patients with T1 tumors, normal renal function, and two undamaged kidneys. It was once reserved for the essential criteria. In cases when the tumor size is 4 cm or smaller, studies conducted in the US have demonstrated that partial nephrectomy is just as effective as radical nephrectomy in terms of tumor control (19).

When technically possible, tumors measuring 7 cm or larger can be safely treated with partial nephrectomy; patients undergoing this procedure have disease-free intervals comparable to those of those treated with radical nephrectomy for the same histologic subtypes. The results of 45 patients with T1b (4-7 cm) conventional clear cell carcinomas who underwent partial nephrectomy were compared to those of 151 patients who underwent radical nephrectomy, with 22 patients initially scheduled for partial nephrectomy but later changed to radical nephrectomy. Patients who underwent partial nephrectomy had significantly higher blood creatinine levels at 3, 6, and 12 months (20), which is a very crude measure of total renal function; nonetheless, there was no difference in disease-free survival between the groups.

Many centers with a lower case load and without advanced laparoscopic skills still use OPN as their first line of defense against tiny kidney cancers (21). For small renal tumors, OPN can have a perioperative morbidity profile comparable to ORN; it can provide similar oncological management as RN while preventing

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CKD (22) while being a more technically complex operation than RN.One of the key benefits of NSS is that it preserves the renal parenchyma, which means that the kidneys can continue to work. Additionally, NSS can prevent contralateral recurrence and save needless nephrectomy in benign tumor instances. The number 23, partial nephrectomy for multiple tumors, may be necessary in certain patients with urgent indications to avoid dialysis and improve quality of life, even though there is a higher risk of disease progression (24).

In the original study by Kutikov and Uzzo (14), they applied the RENAL nephrometry score to 50 patients with localized renal masses and divided their patients into Low (nephrometry sum 4–6) and moderate (nephrometry sum 7–9) tumors more often underwent PN, primarily using a minimally invasive approach, while high complexity (nephrometry sum 10–12) lesions 30 were more likely to undergo open partial or laparoscopic radical nephrectomy. In our study, we had 36 cases. Following this classification, we found that all patients (100%) who had a low nephrometry score (5 cases); 13.07% of patients with a moderate score (3 cases); and 11.11% who had a high score (2 cases) with a nephrometry score mean of 6.6 underwent partial nephrectomy.

Radical surgery was performed on 76.9% of patients with intermediate nephrometry scores (10 instances) and on 88.88% of patients with high scores (16 cases) (mean nephrometry score: 9.9).

The renal nephrometry score was considerably higher in the radical nephrectomy group (mean 9.9 vs. 6.6) with a p-value less than 0.001, indicating that renal nephrometry impacts surgical outcomes. It is worth mentioning two things. Firstly, our study included 36 patients, whereas Kutikov et al. included 50. Secondly, all of our patients underwent open surgery, whether it was a partial or radical nephrectomy. In contrast, Kutikov et al. included 31 patients, 14 of whom underwent robotic or laparoscopic surgeries, and only 19 patients had open surgery, making it 5 radical and 14 partial nephrectomies. In a study involving 142 patients with CT1aN0M0 renal lesions, Naya et al. (25) compared the

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RENAL nephrometry score with the diameter-axial-polar nephrometry (DAP) and how it correlated with the choice of renal tumor resection method. While they did not divide their patients into groups based on complexity, they did find that the average RENAL nephrometry score was 31 points higher in the radical nephrectomy group compared to the partial nephrectomy group (9 vs. 7; with $p < 0.0001$), which is consistent with our findings.

Average hospital stays for patients with low, moderate, and high nephrometry scores (NS) were 4.60, 3.69, and 4.28 days, respectively, with a p-value of 0.35. From 2005 to 2009, researchers at the Department of Urology at Roswell Park Cancer Institute in Los Angeles, CA, USA, examined 159 patients diagnosed with renal tumors who had undergone LPN. The researchers used the criteria put forth by Kutikov and Uzzo (14) to determine the NS. The average length of hospital stay (LOS) for the low-score group was 1.2 days, for the intermediate group was 1.9 days, and for the high-score group was 2.3 days ($P < 0.014$). Due to the fact that all of our patients underwent open operations (RN, PN) instead of laparoscopic surgery, our LOS was longer than the previous study's.

Our analysis found 7 cases of intraoperative complications (19.4%), all of which occurred in high NS. These complications included 2 cases of vascular injury (IVC laceration), 2 cases of intestinal injury, 2 cases of liver and splenic adhesion, and 1 case of pleural injury (p-value = 0.018).

Our cases underwent open surgeries with high scores, in contrast to the laparoscopic surgeries used in the study by Hyan et al. (26), which explains why there was no statistically significant difference in overall complication rates between the low, moderate, and high groups ($P = 0.657$).

The estimated blood loss (EBL) is determined by the nephrometry score; a low score indicates an EBL of 315.0 cc, a moderate score 265.3 cc, and a high score 294.4 cc. The transfusion rates were not significantly different among the three groups, but HAYN et al. (26) did observe that EBL was higher in those with higher RNSs (163 vs. 312 vs. 317; $P = 0.034$). In categories of low, medium, and

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high scores. Our study found an enhanced EBL for low scores due to the use of a fully perfused partial nephrectomy. This operation is particularly employed in low-complexity patients to protect renal function, which could be impaired by cold ischemia procedures.The operative time was determined based on the patient's nephrometry score. A low score required 192 minutes of surgery, a moderate score 170.4 minutes, and a high score 187.2 minutes. The operative time was longer for low-scoring patients due to the need for intraoperative frozen sections, which added 20–25 minutes to the procedure. However, there was no statistically significant difference between the groups (p = 0.077). For low, moderate, and high scores (210, 197, and 202 minutes, respectively), HAYN et al. (26) did not find a statistically significant difference in the mean operating time. By examining the correlation between the nephrometry score and the distance from the collecting system, we discovered that all patients with N1 (8 cases) and 16.66% of patients with N2 (2 instances) had PN, with a mean of 1.2 cases. With a mean of 2.6 patients treated with RN and a significant p-value of 0.001, 83.33 percent of N2 cases and 100 percent of N3 cases underwent RN. The impact of the n parameter on surgical outcome was compared in a study by Shin et al. (27), and the results showed that patients with RN had an average n=2.81, whereas patients with PN had an average n=1.95 (p=0.0001). With a mean of R=2.7 for RN and a mean of R=1.9 for PN, the association between radius (tumor size) and outcome in the examined group was also considered (p value=0.002). Patients with PN had a mean radius (tumor size) of 1.14, while patients with RN had a mean radius of 2.02, with a p-value of 0.0001 (Shin et al., 27). Which are consistent with what we found.

Additionally, in 2013, Oh et al. (28) conducted a retrospective study using RENAL nephrometry scoring on 206 patients who had renal tumors removed using various techniques and approaches. The patients were divided into four groups: open partial nephrectomy (31 patients), laparoscopic partial nephrectomy (39 patients), open radical nephrectomy (53 patients), and open partial

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nephrectomy (83 patients). A significant difference was seen between the groups with radical nephrectomy (mean score = 8.89) and partial nephrectomy (mean score = 6.09), with a p-value less than 0.0001. The clinical results of renal masses have been documented in prior research according to their anatomical characteristics. Both Nadu et al. (29) and Frankel et al. (30) found that patients with central tumors had a higher risk of LOS after laparoscopic partial nephrectomy compared to those with peripheral tumors. There was no difference in length of stay (LOS) or surgical complications between renal tumors that were 4 cm or smaller and those that were 4 cm or larger in a multi-institutional series of open NSS conducted by Patard et al. (31). It is possible that the variations in reported results are due to the fact that open and laparoscopic procedures are different. When comparing the RNS groups, we discovered a statistically significant difference in EBL, intraoperative complications, and surgical outcomes. On the other hand, LOS (length of stay) was not a significant operative time. Low mean nephrometry scores are associated with longer LOS, more EBL, and longer operative times. This finding could be because patients treated with perfusion-based PN need to be observed for longer periods of time, which increases LOS. Additionally, the use of fully perfused PN often leads to increased EBL, while the requirement for a frozen section during perfusion-based PN extends the operative time. Intraoperative complications are more common in high-score nephrectomy due to the need to manage larger masses and the presence of adhesions to the colon, major arteries, and other organs. together with the surgical outcome, which is typically a good score for the RN and a low score for the PN

We conclude that the RENAL nephrometry scoring system is associated with surgical technique in adult cases of renal cell carcinoma and helps as an objective method in deciding the type of surgery and its degree of complexity based on our results and the results of other published studies that have considered this system

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as an objective way to help in the decision of surgical approach to resect renal tumors.

## Conclusions

For organ-confined renal malignancies, the RENAL nephrometry score was associated with intraoperative complications, EBL, LOS, and surgical prognosis. Evidence like this points to the RENAL nephrometry score as a measure of how technically challenging it is to do a full or partial nephrectomy.

## Recommendations

We recommend PN as an elective treatment option due to its safety and reliability, particularly in light of the rising rates of stone disease and other medical conditions in our developing nation and the fact that imaging modalities are allowing for earlier tumor detection in the population at large, although RN is still the most commonly used surgical approach.

## References

1.Lipworth L, Tarone RE, McLaughlin JK. The epidemiology of renal cell carcinoma. J Urol 2006;176:2353–8.
2. B. Shuch, J. S. Lam, and A. S. Belldegrun, ―Open partial nephrectomy for the treatment of renal cell carcinoma,‖ Current Urology Reports, vol. 7, no. 1, pp. 31–38, 2006.
3. M. Jayson and H. Sanders, ―Increased incidence of serendipitously discovered renal cell carcinoma,‖ Urology, vol. 51, no. 2, pp. 203–205, 1998.
4. Ost MC, Kavoussi LR. Image guided percutaneous treatment of renal masses: cryoablation and radiofrequency ablation. AUA Update Series 2007:26:126–35.
5. Naya Yl, Kawauchi A, Oishi M , et al. Comparison of diameter-axial-polar nephrometry and RENAL nephrometry score for treatment decision-making in patients with small renal mass. Int J Clin Oncol 2014;27 .

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Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 5, May 2026

https://eurekaoa.com/index.php/5

6. Oh JH, Rhew HY, Kim TS. Factors influencing the operative approach to renal tumors: analyses according to RENAL. nephrometry scores. Korean J Urol 2014;55(2):97–101.
7. Robson CJ, Churchill BM, Anderson W. The results of radical nephrectomy for renal cell carcinoma. J Urol 101:297–301, 1969.
8. Licht MR and Novick AC. Nephron-sparing surgery for renal cell carcinoma. J Urol 145:1–7, 1994. 37
9. Novick AC. Anatomic approaches in nephron-sparing surgery for renal cell carcinoma. Atlas Urol Clin.
10. Vira MA, Novakovic KR, Pinto Peter A, et al. Genetic basis of kidney cancer: a model for developing molecular-targeted therapies. BJU Int 2007;99:1223–9.North Am 6:39, 1998.
11. DeCastro GJ, McKiernan JM. Epidemiology, clinical staging and presentation of renal cell carcinoma. Urol Clin North Am 2008;35:581–92
12. Sheth S, Scatarige JC, Horton KM et-al. Current concepts in the diagnosis and management of renal cell carcinoma: role of multidetector ct and three-dimensional CT. Radiographics. 2001;21 Spec No (suppl 1): S237-54.
13. B. Shuch, J. S. Lam, and A. S. Belldegrun, ―Open partial nephrectomy for the treatment of renal cell carcinoma,‖ Current Urology Reports, vol. 7, no. 1, pp. 31–38, 2006.
14. Kutikov A, Uzzo RG. The R.E.N.A.L. nephrometry score: acomprehensive Standardized system for quantitating renal tumor size, location and depth. J Urol 2009;182:844–53.
15. Zhang GM, Zhu Y, Gan HL, et al. Use of RENAL nephrometry scores for predicting tumor upgrading between core biopsies and surgical specimens: a prospective ex vivo study. Medicine (Baltimore) 2015;94(8): e581.
16. Jang HJ, Song W, Suh YS, et al. Comparison of perioperative outcomes of robotic versus laparoscopic partial nephrectomy for complex renal tumors
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ISSN 2760-4942 (Online) Volume 2, Issue 5, May 2026

https://eurekaoa.com/index.php/5

(RENAL nephrometry score of 7 or higher). Korean J Urol 2014 Dec;55(12):808–13.

17. Reddy UD, Pillai R, Parker RA, et al. Prediction of complications after partial nephrectomy by RENAL nephrometry score. Ann R Coll Surg Engl 2014 Sep;96(6):475–9.

18.Chow WH, Devesa SS, Warren JL, et al . Rising incidence of renal cell cancer in the United States. JAMA 1999; 281:1628-1631.

19. Leibovich BC, Blute ML, Cheville JC, et al. Nephron sparing surgery for appropriately selected renal cell carcinoma between 4 and 7 cm results in outcome similar to radical nephrectomy. J. Urol. 2004; 171: 1066–70.

20. Dash A, Vickers AJ, Schachter LR, et al. Comparison of outcomes in elective partial vs. radical nephrectomy for clear cell renal cell carcinoma of 4–7 cm. BJU Int 2006;97:939–45.

21. Gill IS, Kavoussi LR, Lane BR, et al. Comparison of 1,800 laparoscopic and open partial nephrectomies for single renal tumors. J. Urol. 2007; 178: 41–6.

22. Lau WK, Blute ML, Weaver AL, et al. Matched comparison of radical nephrectomy vs. nephron-sparing surgery in patients with unilateral renal cell carcinoma and a normal contralateral kidney. Mayo Clin. Proc.2000;75:1236–42.

23. Lau WK, Blute ML, Weaver AL, et al. Matched comparison of radical nephrectomy vs. nephron-sparing surgery in patients with unilateral renal cell carcinoma and a normal contralateral kidney. Mayo Clin.Proc.2000;5:1236–42.39

24. Ghavamian R, Cheville JC, Lohse CM, et al. Renal cell carcinoma in the solitary kidney: an analysis of complications and outcome after nephron sparing surgery. J. Urol. 2002; 168: 454–9.

25. Naya Yl, Kawauchi A, Oishi M, Ueda T, Fujihara A, Naito Y, et al. Comparison of diameter-axial-polar nephrometry and RENAL nephrometry score for treatment decision-making in patients with small renal mass. Int J Clin Oncol 2014;27.

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ISSN 2760-4942 (Online) Volume 2, Issue 5, May 2026

https://eurekaoa.com/index.php/5

26. Matthew H. Hayn, Thomas Schwaab, Willie Underwood, et al. RENAL nephrometry score predicts surgical outcomes of laparoscopic partial nephrectomy. BJUI. 2010 august; 10 8 : 8 7 6 – 8 81.
27. Shin SJ, Ko KJ, Kim TS, et al. Trends in the Use of Nephron-Sparing Surgery over 7 Years: An Analysis Using the R.E.N.A.L. Nephrometry Scoring System. PLoS ONE. November 24, 2015; 1371:1-10 .
28. Oh JH, Rhew HY, Kim TS. Factors influencing the operative approach to renal tumors: analyses according to RENAL nephrometry scores. Korean J Urol 2014;55(2):97–101.
29. Nadu A, Kleinmann N, Laufer M, Dotan Z ,et al. Laparoscopic partial nephrectomy for central tumors: analysis of perioperative outcomes and complications. J Urol 2009; 181: 42 7.
30. Frank I, Colombo JR Jr, Rubinstein M, Desai M et al. Laparoscopic partial nephrectomy for centrally located renal tumors. J Urol 2006; 175: 849–52.40
31. Patard JJ, Pantuck AJ, Crepel M et al.Morbidity and clinical outcome of nephron-sparing surgery in relation to tumour size and indication. Eur Urol 2007; 52: 148–54 .