



## CLINICOPATHOLOGICAL SPECTRUM OF NEPHRECTOMY SPECIMEN IN RELATION TO SERUM SIALIC ACID: A SINGLE CENTRE EXPERIENCE.

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**ABSTRACT** This study aimed to determine the incidence of renal lesions in patients visiting our hospital along with clinicopathological characteristics, histological patterns of various renal lesions and their relation with serum sialic acid. A total of 50 nephrectomy cases were included, of which 66% were neoplastic and 34% were non-neoplastic. Clear cell RCC (51.5%) was the commonest tumor in adults and Wilms tumor (6.1%) in children. Serum sialic acid in non-neoplastic lesions had a median (interquartile range) of 62.38 mg/dl (4.49 mg/dl) and neoplastic lesions had a mean (SD) of 66.70 mg/dl (4.27 mg/dl). This study provides a fair insight into the morphological pattern of lesions in the nephrectomy specimens at our institution. In our study we found, sialic acid levels are significantly elevated in renal neoplasms than in non-neoplastic lesions. Therefore, sialic acid levels can be used as diagnostic adjuncts in renal tumors.

**KEYWORDS :** Nephrectomy; Renal Cell Carcinoma; Sialic Acid.

### Introduction

The kidney is a major organ of the human body and has important functions like excretion, acid-base balance and maintenance of salt and water metabolism. The incidence of renal diseases has been increasing in recent years. Chronic kidney disease is now recognized as a major medical problem worldwide. Nephrectomy is the standard surgical procedure performed in irreversible kidney damage and renal tumors. Despite recent advances in ultrasound and computerized tomography for detecting renal tumors almost 30% of patients present with metastasis<sup>1</sup>. Therefore, early detection of RCC is critical. There is a need to identify serum markers to improve diagnostic accuracy and predict patient survival rate after surgery.

**Aim:** This study was conducted to evaluate the neoplastic and non-neoplastic conditions encountered in nephrectomy specimens received in our department for over two years. And assess their clinicopathological characteristics and also evaluate their relation with serum sialic acid levels.

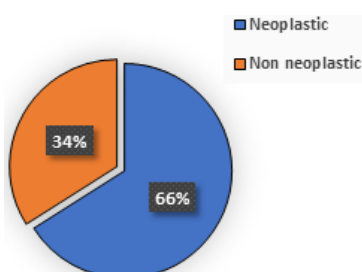
### Materials and Methods:

The present study is a cross-sectional study, done for a period of 2 years, from 2016 to 2018 which included all the nephrectomy specimens received in the department of pathology. A total of 50 nephrectomies were included. Patient particulars including age, sex, clinical diagnosis, radiological details, gross morphology and microscopic details were noted from the data available. Representative bits taken were processed according to standard operating protocols. Sections were cut at 3-4 microns thickness and stained with Hematoxylin and Eosin. Immunohistochemistry (IHC) was not done.

### Results

A total of 50 cases of nephrectomy specimens were evaluated. The patient's age ranged from 1 to 84 years with a mean age of 52 years. The most commonly affected age group was the 5<sup>th</sup>-7<sup>th</sup> decade. The majority of the patients were males accounting for 66% with a male to female ratio of 1.9:1. The most common presenting complaints were loin pain (78%) followed by haematuria (22%). Neoplastic lesions were predominant, accounting for 66% of the cases and non-neoplastic lesions accounted for 34% (Figure 1).

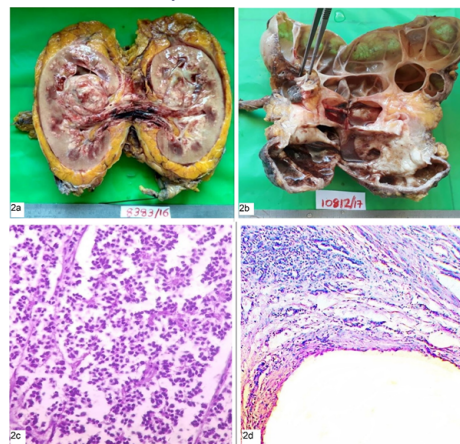
**Figure 1: Distribution of neoplastic & non-neoplastic lesions.**



The non-neoplastic lesions were commonly seen in the 4<sup>th</sup>-5<sup>th</sup> decade. Among 17 non-neoplastic lesions, 76.5% were inflammatory and 23.5% were cystic lesions. Among the inflammatory lesions, chronic pyelonephritis with hydronephrosis was more commonly seen. (Table 1). Few cystic lesions were also noted.

The neoplastic lesions were more commonly seen in the 6<sup>th</sup> decade with a mean age of 54.8 years. Neoplastic lesions were common in males (63.6%) with a male to female ratio of 2:1. Among the malignant tumors, clear cell RCC (51.5%) was the most common tumor, followed by papillary RCC (15.3%), infiltrating urothelial carcinoma (9.1%), nephroblastoma (6.1%) and 3% each of chromophobe RCC, multilocular Cystic RCC and PNET (Table 1). Benign tumors included 3% each of leiomyoma, oncocytoma, and mixed epithelial and stromal tumors. Capsular invasion was seen in 6 cases, perinephric fat invasion in 5 cases, Gerota's fascia invasion in 2 cases, vascular invasion in 2 cases, adrenal invasion in 2 cases, and renal sinus invasion in 2 cases. Renal vein thrombosis was seen in 6 cases, inferior vena cava thrombosis in 5 cases, of which one case had thrombus extending to the right atrium.

**Figure 2a) Macroscopy-** cut surface shows tumor in the midpole of kidney with renal vein thrombus; **2b) Gross - Hydronephrosis (arrowhead- Impacted Calculi); 2c) Microscopy shows monotonous population of small, round blue cells with scant cytoplasm, uniform nuclei. (H&E X 100); 2d) Cyst lined by hobnail shaped cells with septa containing cellular fibrous tissue with chronic inflammatory cells.**



There were 4 cases with distant metastasis, of which two had metastasis to lung, one had metastasis to spleen and pancreas and one case has metastasis to bone. Of the 24 cases of RCC, Fuhrman nuclear grade 2 was the most common (58.3%).

**Table 1: Histopathological spectrum of lesions:**

Renal Tumors	Total number	Percentage
Clear Cell Renal cell carcinoma	17	51.5%
Papillary renal cell carcinoma	5	15.3%
Chromophobe renal cell carcinoma	1	3.0%
Multilocular Cystic RCC	1	3.0%
Infiltrating urothelial carcinoma	3	9.1%
Nephroblastoma	2	6.1%
Ewing's sarcoma / PNET	1	3.0%
Mixed epithelial and stromal tumor	1	3.0%
Oncocytoma	1	3.0%
Leiomyoma	1	3.0%
CPN with hydronephrosis	5	29.3%
Acute on Chronic Pyelonephritis	2	11.8%
Xanthogranulomatous Pyelonephritis	2	11.8%
Hydronephrosis	3	17.6%
Pyonephrosis	1	5.9%
Simple Renal Cyst	2	11.8%
ADPKD	1	5.9%
Multicystic dysplasia	1	5.9%

The Serum sialic acid levels in non-neoplastic lesions ranged from 56.10 - 71.48 mg/dl and had a median (interquartile range) of 62.38 mg/dl (4.49 mg/dl). Serum sialic acid levels in neoplastic lesions ranged from 58.41 - 71.75 mg/dl and had a mean (SD) of 66.70 mg/dl (4.27 mg/dl). A Mann Whitney U test was done to know the difference between sialic acid levels in non-neoplastic and neoplastic lesions. The p-value is less than 0.05, suggesting a significant difference between the serum sialic acid levels of non-neoplastic and neoplastic lesions. The serum sialic acid levels in patients with neoplasms were more significantly elevated than in non-neoplastic lesions.

#### Discussion:

Renal diseases are a common cause of morbidity and mortality worldwide. The indications of nephrectomy vary from inflammatory to neoplastic lesions. RCC is the 8<sup>th</sup> most common malignancy affecting adults. RCC is more common in men than in women with a male is to female ratio of 2:1. Most tumors present in the fifth to seventh decade of life<sup>2</sup>.

In our study, a total of 50 nephrectomies were evaluated. The maximum number of patients were in 5<sup>th</sup>-7<sup>th</sup> decade, accounting for 64% of the cases. The mean age was 51 years. Both these findings were in concordance with Mehra et al<sup>3</sup>. Renal lesions are more commonly seen in males. In our study, males were predominantly affected (66%) than females (34%) with a male to female ratio of 1.9:1. This correlated with study done by Latif et al<sup>6</sup>. Flank pain was the most common complaint, encountered in 78% of cases, which was comparable with study done by Bashir et al<sup>5</sup>. Radical nephrectomy was the most common nephrectomy performed in 27 cases (54%), which is in concordance with Mehra et al<sup>3</sup>. The left kidney (52%) was most commonly affected in our study and also the upper pole was more involved (48%). Both these observations were similar to study done by Bashir et al<sup>5</sup>.

In our study majority of the cases were neoplastic lesions, accounting for 66% followed by 34% of non-neoplastic lesions. These findings are in concordance with Narang et al<sup>7</sup>. The non-neoplastic lesions were most commonly seen in 4<sup>th</sup>-5<sup>th</sup> decade, which is at par with study done by Sreedhar et al<sup>8</sup>. Chronic pyelonephritis was the most common non-neoplastic lesion in our study accounting for about 52.9%. This was in concordance with Kathirvelu et al<sup>4</sup>. The neoplastic lesions were predominantly noted in the 6<sup>th</sup> decade, accounting for 39.3% of the cases. Neoplastic lesions were commonly seen in males (66.7%), with male to female ratio of 2:1 which was similar to study done by Bashir et al<sup>5</sup>.

The histopathological spectrum of renal neoplasms encountered in the study has been classified according to the World Health Organisation classification (2016). In our study, the majority of the tumors were renal cell carcinoma (72.7%). Various published literature reveals that 90% of malignant tumors of the kidney are renal cell carcinoma. Among RCC, the most common type encountered was, clear cell RCC accounting for 51.5% (Table 1). This is concordance with Kumar et al<sup>2</sup> and Narang et al<sup>7</sup>. Capsular invasion was seen in 6 cases, perinephric fat invasion in 5 cases, Gerota's fascia invasion in 2 cases, which is at

par with the study done by Latif et al<sup>6</sup>. Renal vein invasion was seen in 12% of cases, which is in concordance with 9.2% of cases in a study done by Bashir et al<sup>5</sup>. Renal cell carcinomas were graded according to Fuhrman's nuclear grade. Of the 24 cases of RCC, 58.3% were Fuhrman grade II, which was in accordance with Narang et al<sup>7</sup>. Pathologic staging of RCC is done according to the 2016 revised TNM staging system, based on the extent of the tumor invasion, nodal status, and metastasis. In our study maximum numbers of cases were in stage III (36.7%), which is in concordance with Latif et al<sup>6</sup>.

However, to our sound knowledge, this is the first of a kind study. There is no such study in the literature that assesses serum sialic acid levels in a spectrum of nephrectomy specimens. Our second objective was to determine the relation of serum sialic acid levels in non-neoplastic and neoplastic renal lesions. Serum sialic acid in non-neoplastic lesions ranged from 56.10 - 71.48 mg/dl and had a median (interquartile range) of 62.38 mg/dl (4.49 mg/dl). Serum sialic acid in neoplastic lesions ranged from 58.41 - 71.75 mg/dl and had a mean (SD) of 66.70 mg/dl (4.27 mg/dl). The serum sialic acid levels in patients with neoplasms were more significantly elevated than in non-neoplastic lesions (p-value of 0.004).

A significant difference between sialic acid levels in each stage of RCC was demonstrated. When the sialic acid values of patients within different stage groups were compared, there was no statistically significant difference and hence showed a poor correlation between sialic acid and staging. This is in concordance with the study done by Erbil et al<sup>9</sup> and Echenique et al<sup>10</sup>.

#### Conclusion

The incidence of renal lesions has been increasing in recent years due to lifestyle changes. Renal lesions are being detected early in relatively younger patients, due to the emergence of imaging techniques and sophisticated laboratory investigations. Nephrectomy is performed in non-functioning kidney and renal tumors. Malignant tumors of the kidney are increasing over the non-neoplastic renal lesions. Hydronephrosis and chronic pyelonephritis are the commonest causes for the non-functioning kidney. Clear cell RCC is the commonest renal malignancy. The histological classification of RCCs is of utmost importance, given therapeutic and prognostic implications.

Currently, there is no diagnostic modality for early detection of renal cancer, other than incidental radiologic discovery. Serum sialic acid levels are significantly elevated in renal tumors than in non-neoplastic lesions. Therefore, they can be used as diagnostic adjuncts in renal tumors. However, more studies would be required, to prove that sialic acid can be a marker for renal cancers.

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