International Journal of Clinical and Diagnostic Pathology

ISSN (P): 2617-7226
ISSN (E): 2617-7234
www.patholjournal.com
2022; 5(4): 104-108
Received: 03-09-2022
Accepted: 05-10-2022

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Histopathological study of non-neoplastic and neoplastic lesions of nephrectomy specimen at our institute

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DOI: https://doi.org/10.33545/pathol.2022.v5.i4b.500

Abstract
Background: Nephrectomy is a standard surgical procedure and all specimens were studied for the evaluation of Non- Neoplastic and Neoplastic lesions of kidney and compare it with other studies over a period of 1 year in Pathology department at Guru Gobind Government Hospital, Shri M. P. Shah Government Medical College, Jamnagar.
Materials and Methods: The study was carried out on 25 nephrectomy specimens over a period of 1 year, and histopathological diagnosis given on the basis of light microscopic findings.
Aims and Objectives
1. To find out the different histopathological findings in received nephrectomy specimen.
2. To analyze gender and age wise frequency of the neoplastic and non- neoplastic lesions of the kidney.
3. To study different lesions and to evaluate the rare conditions.

Results: Among 25 nephrectomy specimens age range was 4-90 years and highest incidence was observed 41-50 years of age group with 36% (9 cases) while Lowest percentage of patients belonged to <10 years age group with 4% (1 case), female patients were 9 cases (36%), male patients were 16 cases (64%). Youngest age was 4 year (Clear cell Sarcoma) and oldest age was 90 years (Papillary Renal Cell Carcinoma), non-neoplastic lesions were common comprising 68% (17 cases) in which Chronic Pyelonephritis was the most common accounting to 40% (10 cases) and neoplastic lesions were 32% (8 cases) in which Renal Cell Carcinoma- Clear Cell Type were common accounting to 20% (05 cases).
Conclusion: Non neoplastic lesions were more common than neoplastic lesion among which chronic pyelonephritis was the most common and renal cell carcinoma -Clear cell type was the common among all the neoplastic tumors. Peak age of incidence was 5th decade with chief complain of flank pain.

Keywords: Nephrectomy, non-neoplastic lesions, neoplastic lesions, kidney

Introduction
Kidneys are paired, bean shaped, retroperitoneal excretory organs in the body. Kidneys are located in the posterior abdominal cavity at the level of upper border of T_{12} to L3 vertebra. Kidneys are covered by fibrous capsule, renal fascia, peri-renal fat, para-renal fat.
Kidneys are one of the major organs of the human body that serve several essential functions. Their main function is to regulate the balance of electrolytes in the blood, along with maintaining pH homeostasis. They also remove waste products of metabolism from blood and produce erythropoietin to maintain hematopoiesis and an important enzyme, renin to maintain blood pressure [1].
Kidneys are affected by various non-neoplastic and neoplastic pathological processes. Common clinical conditions involving the kidney include the nephritic and nephrotic syndromes, renal cysts, acute kidney injury, chronic kidney disease, urinary tract infection, nephrolithiasis, urinary tract obstruction and various cancers of the kidney [2].
Because of widespread use of imaging, increased number of renal lesions is being discovered. These renal conditions can be managed medically or surgically. Surgical removal of the kidney is known as nephrectomy [1].
Nephrectomy is the standard surgical procedure performed in irreversible kidney damage and in the case of renal malignancies [1]. Simple nephrectomy is indicated in patients with symptomatic chronic infection, obstruction, calculus disease or severe traumatic injury that

caused irreversible renal damage and also to treat endovascular hypertension. Radical nephrectomy is standard treatment with localized renal carcinoma with a normal contralateral kidney [3].

Among the non-neoplastic indications in nephrectomies, non-functioning kidney in obstructive nephropathies and chronic pyelonephritis are the most common [4]. The management of severely diseased tuberculous kidney is indisputable and mandatory [5]. Among neoplastic lesions in kidney renal cell carcinoma accounts for 80-85 percent of malignant kidney tumors [6]. Nephroblastoma (Wilms tumor) is the most common malignant pediatric renal tumor usually seen at age 2-5 years. Multi cystic nephroma is a rare benign cystic lesion of kidney & it is grouped under mixed epithelial & stromal tumor in WHO classification of renal tumors [7]. Clear cell sarcoma kidney & congenital mesoblastic nephroma (CMN) are rare in children.

Indications for nephrectomy may show geographic variations with different urologic causes in different countries worldwide. Bold objective of this study is to observe the spectrum of histopathological lesions in nephrectomy cases received in Pathology department at Guru Gobindsingh Hospital, Shri M. P. Shah Government Medical College, Jamnagar and then to know the indications for the same in our community practice.

Aims and objectives

1. To find out the different histopathological findings in received nephrectomy specimen.
2. To analyze gender and age wise frequency of the neoplastic and non- neoplastic lesions of the kidney.
3. To study different lesions and to evaluate the rare conditions.

Type of study

Prospective & Retrospective Study of 1 Year. (From December 2021- November -2022)

Material and Methods

Place of study

At Guru Gobind Government Hospital, Shri M. P. Shah Government Medical College, Jamnagar.

Design of study

Prospective & Retrospective Study.

Duration of study

1 Year. (From December 2021-November 2022)

Sample size

Total 25 Specimen Received.

Sample Type

All Nephrectomy specimen.

Specimen Processing

Grossing was done (findings as mentioned in table no. I) to see representative areas from the whole specimen than Fixation was done using 10% neutral buffered formalin followed by Passing, Dehydration, Embedding, Block Trimming and 3-5 um thick microtome Sectioning were taken and Slide were Prepared And Stain With Hematoxylin & Eosin Stain than examined by light microscopy and histopathological diagnosis given on the basis of microscopic morphology.

Inclusion criteria

All age group, sex group and different types of nephrectomy specimen-Simple, Partial, Radical and Laparoscopic Nephrectomy specimen included into the study.

Exclusion criteria

Small incisional/ core needle biopsy, autolyzed samples were not included in to this studies.

Results

Table 1: Distribution on the bases of gross findings which were recorded during examination which also helps in diagnosis of different lesions

Lesions	Total case (%)
Small, atrophied contracted kidney with thick capsule	14 (56%)
Enlarged swollen kidney with capsule was tense and strip off easily	02 (8%)
On cut section showing pale red area and grayish white smooth area or yellowish area	01 (4%)
On cut section greyish yellow or reddish mass, cystic and hemorrhagic areas	07 (28%)
Single, Large, Irregular structure with nodular surface. On cut section shows homogenous grayish white gelatinous area with occasional cyst like areas	01 (4%)
Total	25 (100%)

In the total 25 nephrectomy biopsies analysed on gross examination maximum 14 cases (56%) of specimen received showed small atrophied contracted kidney belongs to group of Non neoplastic lesions in case of chronic pyelonephritis and chronic non-specific inflammation and 2 cases (8%) of enlarged and swollen kidney in case of acute pyelonephritis.

Table 2: Age wise and sex wise distribution of Non neoplastic and Neoplastic Lesions of Nephrectomy specimen. (N = 25)

Age (Years)	Male (%)	Female (%)	Total %	Non Neoplastic (%)	Neoplastic (%)
0-10	01 (4%)	00	01 (4%)	00	01 (4%)
11-20	02 (8%)	01 (4%)	03 (12%)	02 (8%)	01 (4%)
21-30	01 (4%)	01 (4%)	02 (8%)	01 (4%)	01 (4%)
31-40	02 (8%)	00	02 (8%)	02 (8%)	00
41-50	08 (32%)	01 (4%)	09 (36%)	06 (24%)	03 (12%)
51-60	01 (4%)	03 (12%)	04 (16%)	03 (12%)	01 (4%)
61-70	01 (4%)	01 (4%)	02 (8%)	01 (4%)	01 (4%)
>70	00	02 (8%)	02 (8%)	01 (4%)	01 (4%)
Total (%)	16 (64%)	09 (36%)	25 (100%)	16 (64%)	09 (36%)

In the total 25 nephrectomy biopsies analysed maximum 16 cases (64%) of Non neoplastic lesions and 9 cases (36%) of Neoplastic lesions among which maximum 6 cases (24%) Non neoplastic lesions and 3 cases (12%) of neoplastic lesions were seen in 41-50 years of age group (5th decade).

Male constituted total 16 cases (64%) and females total 09 cases (36%) with male to female ratio of 1.7:1 and 5th decade (36%) was most common age group in 25 studied nephrectomy specimen.

Table 3: Sex wise and histological type wise distribution of Nephrectomy specimens (N = 25)

Lesions	Number of Cases (%)	Male (%)	Female (%)
Non Neoplastic Lesions	16 (64%)	10 (40%)	6 (24%)
Chronic Pyelonephritis	10 (40%)	08 (32%)	02 (8%)
Chronic Non Specific Inflammation	04 (16%)	02 (8%)	02 (8%)
Acute inflammation	02 (8%)	00	02 (8%)
Neoplastic Lesions	9 (36%)	6 (24%)	3 (12%)
Angiomyolipoma with chronic pyelonephritis	01 (4%)	01 (4%)	0
Renal cell carcinoma - Clear Cell Variant	05 (20%)	03 (12%)	02 (8%)
Papillary Renal cell carcinoma	02 (8%)	01 (4%)	01 (4%)
Clear Cell Sarcoma	01 (4%)	01 (4%)	0

In the total 25 nephrectomy biopsies analyzed, the non-neoplastic lesions were common comprising 64% (16 cases) and neoplastic lesions were 36% (9 cases). Among the non-neoplastic lesions, inflammatory conditions were the most common among which Chronic pyelonephritis 40% (10 cases) was the most common among which 8 cases (32%) of male category and 2 cases (8%) of female category, followed by 4 cases (16%) of chronic nonspecific inflammation and it was the second common non- neoplastic lesion comprising 4cases (16%) out of 25 nephrectomy specimen analyzed.

Among Neoplastic Condition Renal Cell Carcinoma- Clear Cell Variant (5 cases) 20% was the most common, followed by 8% (2 cases) of papillary renal cell carcinoma and clear cell sarcoma 4% (1 case).

Male constituted 16 cases (64%) among which Non neoplastic lesions were 10 cases (40%) and Neoplastic lesions were 6 Cases (24%), females constituted total 09 cases (36%) among which Non neoplastic lesions were 6 cases (24%) and Neoplastic lesions were 3 (12%) cases out of 25 nephrectomy specimen studied.

Distribution of nephrectomy lesion

According the study maximum cases were reported of inflammatory condition in Non-neoplastic condition. Chronic pyelonephritis (10 cases) was the most common condition found in our study followed by Chronic Non Specific Inflammation (4 cases).

In neoplastic condition total 9 cases were reported among which 7 cases belongs to the malignant tumor of Renal Cell Carcinoma, in which total 5 cases of Renal Cell Carcinoma - Clear Cell variant and 2 cases of papillary variant of Renal Cell Carcinoma followed by 1 case of Clear Cell Sarcoma and 1 case of Angiomyolipoma with chronic pyelonephritis.

Discussion

In the present study total of 25 nephrectomy specimens were received in the pathology department of Shri M P Shah Medical College, Jamnagar. Age range of cases was from 4 year to 90 year. The highest percentage of patient belonged to age group 41-50 years.

Most common clinical symptom was flank pain (90%) followed by haematuria, fever, lump in abdomen Least common was epigastric pain (2%) which is similar to that seen in study done by Popat *et al*. [8]

Out of 25 nephrectomy cases 16 (64%) cases were non-neoplastic and 09 (36%) cases were neoplastic, similar higher incidence of non-neoplastic lesions of 63.8% and 78.1% were reported in stud done by Chitra *et al*. [9].

Male constituted 16 cases (64%) and females 09 cases (36%) of 25 patients who went nephrectomy with male to female ratio of 1.7:1. This was similar to study done by Lathif F *et al*. [10] and Badmus *et al*. [11] who found male to female ratio of 1.9:1 and 2:1 in their studies respectively. However Rafiq *et al*. [12] found slight female preponderance in his study.

It was observed slightly male predominance over female in cases of chronic pyelonephritis as a pure lesion and associated with Angiomyolipoma which is differ from study of Abdulghafoor *et al*. [13] and Chitra *et al*. [9].

Non Neoplastic diseases

A majority of cases were seen between 41-50 years of age. Maximum number of malignant cases were seen in age group 41-50 years. Similar to that seen in study done by Shaila *et al*. [14].

Maximum number of cases were of Non neoplastic. Non Neoplastic (16 cases) were the most common followed by malignant cases (9 cases). This was similar to study done by Mannan R *et al*. [15]

Among the non-neoplastic lesions (16 cases), inflammatory conditions were the most common. Chronic pyelonephritis (10 cases) was the most common inflammatory condition for which nephrectomy was done which was similar to study done by Popat VC *et al*. [8] and Amin *et al*. [16]. It was followed by Chronic Non-specific Inflammation (4 cases), Acute inflammation (2 cases).

Out of 25 cases, neoplastic cases were 9 in number. Among the neoplastic tumour Renal Carcinoma- Clear Cell variant (5 cases) was the most frequent. This was similar to the study done by Shaila *et al*. [14]. Other were two cases of Papillary Renal Cell Carcinoma followed by one case each of Clear Cell Sarcoma and Angiomyolipoma with chronic pyelonephritis.

Pyelonephritis is seen in all age group. In the present study majority of pyelonephritis were seen in 5th decade this was comparable to the studies conducted by Chaitra *et al*. [9], Amin *et al*. [16] and Bharti *et al*. [17]

Globally the incidence of Xanthogranulomatous Pyelonephritis is 0.6 to 1% with female preponderance. It was not encountered here, so differ from study done by Swarna Lata Ajmera *et al*. [18], and Savita D *et al*. [19] and Shaila *et al*. [14] also noted similar type of observation in their studies.

Neoplastic diseases

Nephrectomy is a standard treatment offered to patients who present with benign as well as malignant mass lesions in the kidney.

Most renal carcinomas are sporadic. In the present study, a total of 09 neoplastic lesions were reported. This was similar to the findings of Shaila *et al*. [14] who observed that the majority of malignant neoplasm of the kidney were renal cell carcinomas.

Most common malignant tumor in adults is renal cell carcinoma (RCC) total 7 cases reported. Rare was Clear Cell Sarcoma in pediatric patient. Renal Cell Carcinoma mainly affects older individuals usually in 4th to 5th decades and show male preponderance.

Incidence of renal cell carcinoma (7 cases) was more in male gender 5 cases (71.4%) than female gender 02 cases (28.6%) Amin *et al*. [16] and Savita *et al*. [19] also observed male predominance in their studies**.**

Among the renal cell carcinomas (7 cases) it was observed that left sided involvement was more 6 cases (85.8%) than right side 01 cases (14.2%), concordance to that observed by Swarnlata Ajmera *et al*. [18] -63.3% in left kidney and 36.7% in right kidney, similar findings were also noted by Amin *et al*. [16] and Savita *et al*. [19] in their studies.

Majority of the renal cell carcinomas were seen in 5th decades of life. This observation is similar to the study done by Chitra *et al*. [9]. In the present study commonest type of renal cell carcinoma (7 cases) was clear cell type accounting for 05 cases (71.4%) followed by 2 cases (28.6%) of papillary type. This is in accordance with many other studies like Shaila *et al*. [14], Chitra *et al*. [9].

Gross of clear cell sarcoma

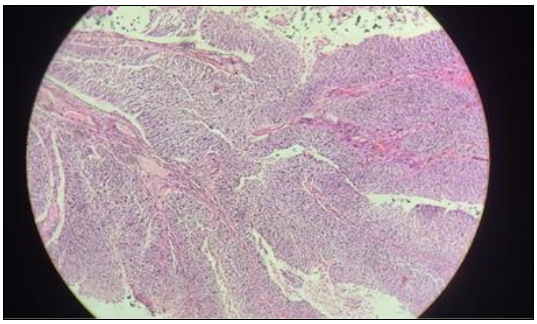
Specimen showing single, Large, Irregular structure with nodular surface. On cut section shows homogenous grayish white gelatinous area with occasional cyst like areas

Gross of Angiomyolipoma

Received specimen on cut section showing pale red area and gray white smooth area (smooth muscle component) or yellowish area (adipose component).

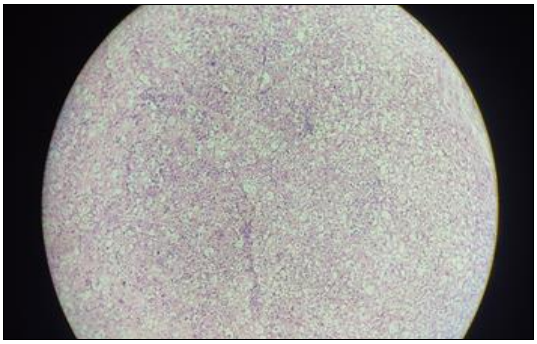
Histopathology of papillary renal cell carcinoma

This section shows Papillary and few tubular architecture with fibro vascular core having prominent nuclear pleomorphism and eosinophilic cytoplasm.



Histopathology of clear cell renal carcinoma

In this section sheets and compact nest and sheets of cells with clear cytoplasm and distinct membrane are seen



Conclusion

There are many differential diagnosis possible for a nephrectomy specimen. For accurate diagnosis and treatment correlation of clinical, radiological and pathological modalities are important. In our study, non-neoplastic lesions were more common than neoplastic lesions among which chronic pyelonephritis was the most common histopathological finding reported. Renal cell carcinoma -Clear cell type was the most common among all the neoplastic lesions. Peak age of incidence of nephrectomy cases were seen in the 5th decade and majority of them presented with chief complain of flank pain as a presenting symptom

Conflict of Interest

Not available

Financial Support

Not available

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How to Cite This Article
Patel P, Patel H, Nayan K, Mehta D. Histopathological study of non-neoplastic and neoplastic lesions of nephrectomy specimen at our institute. International Journal of Clinical and Diagnostic Pathology. 2022;5(4):104-108.