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Histopathological study of various nephrectomy specimens received at tertiary care hospital: A retrospective study

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Abstract

Introduction: The Kidney is one of the most highly differentiated organs in the body affected by various disease processes, some resulting in permanent damage leading to surgical removal of kidney i.e., nephrectomy. Indications for nephrectomy are varied including irreversible damage by chronic infections, obstructive causes stricture and calculus diseases, vesicouretric reflex, congenital displasia, nephrosclerosis, cystic disease and also severe traumatic injury, non-corrective renal artery disease leading to renovascular hypertension.

Simple nephrectomy is done to remove the irreversibly damaged, non-functioning kidneys involved by different benign pathologic condition while radical nephrectomy is indicated in malignant lesion.

Aim: To assess the patterns and morphology of lesions in nephrectomy specimens in a tertiary care hospital.

Material and Method

- This retrospective study carried out in the Department of Pathology in B.J. Medical college and civil Hospital, Ahmedabad, Gujarat, India.
- A total of 63 nephrectomy specimens received during the period of 1 year and 5 months from January 2021 to may 2022 were included in the study. Paraffin blocks and slides along with case records were retrieved and studied.

Results: Patients with a male to female ratio of 1.25:1. Maximum cases of chronic pyelonephritis were seen in the age group of 20-40 years. Among 63 nephrectomy cases, 38 cases were non-neoplastic lesions and 25 of the cases were neoplastic lesions. Among 25 cases of renal cell carcinoma, clear cell renal cell carcinoma (13) cases were the most frequent followed by papillary RCC (4) cases.

Conclusion: Nephrectomy is an accepted surgical procedure for non-functioning kidneys due to various pathological disease processes. Most common affected age group was 20-40 years. Non neoplastic lesions were the most common cause for nephrectomies. Chronic pylonephritis with hydronephrotic changes being the most common cause. Clear Cell renal cell carcinoma being the common among malignant tumors. Other benign and malignant lesions being rare.

Keywords: Nephrectomy, chronic pyelonephritis, clear cell renal cell carcinoma

Introduction

The Kidney is one of the most highly differentiated organs in the body. Its cellular diversity modulates a variety of complex physiologic processes.[1] The kidneys are affected by various disease processes, some resulting in permanent damage leading to surgical removal of the organ i.e., nephrectomy. Symptomatic chronic infections, obstruction calculous disease or severe traumatic injury may cause end stage renal damage, ultimately requiring nephrectomy. Nephrectomy is also done for treatment of renovascular hypertension, severe parenchymal damage resulting from nephrosclerosis, pylelonephritis, vesicoureteric reflux, congenital dysplasia and benign and malignant tumours.[2,3]

For accurate diagnosis histopathology evaluation of renal tumor is necessary. Moreover, currently the ideal standard in the treatment of all tumors of kidney is radical or partial nephrectomy.[4] Histopathologic examination of tumor in nephrectomy specimens is essential to establish histologic type and to record accepted histopathological prognostic markers like i.e. tumor size, histological subtype, nuclear grade, and stage in cases of malignant lesion.[4]

Nephrectomy is of many types; partial, simple and radical nephrectomy. Partial nephrectomy involves removing a small portion of the kidney. A simple nephrectomy performed for living donor transplant purposes requires removal of the kidney and a section of the attached ureter.

Radical nephrectomy involves removing the entire kidney including adrenal gland and the fatty tissue surrounding the kidney [5].

Kidneys with end stage renal disease can give rise to major complications such as massive bleeding for which nephrectomy may be indicated. Other less frequent indications for nephrectomy intractable hypertension, pain, and repeated infections. Kidney removed for one of the distinct but related conditions such as obstructive nephropathy, hydronephrosis, and chronic pyelonephritis is the most frequent type of nephrectomy specimen for nonneoplastic renal diseases in both adults and children.

Xanthogranulomatous pyelonephritis is also an indication for nephrectomy. Nephrectomy is the treatment modality in cystic renal dysplasia [6].

Renal tumours comprise a diverse spectrum of neoplastic lesions with patterns that are relatively distinct for children and adults. A wide variety of both benign and malignant tumours arise from different components of the renal parenchyma, notably tubular epithelium. Radical or partial nephrectomy is the treatment of choice for a great proportion of patients with renal tumors [6, 7].

Primary squamous cell carcinoma kidney is a very rare entity. The incidence of renal squamous cell carcinoma among renal tumor is in the range of 0.5-0.8% [8].

Wilm's tumor though ranked 5th in frequency among childhood solid tumors and it is the most common childhood abdominal malignancy. It is seen primarily in infants, 50% of the cases before the age of 3 years and 90% before the age of 6 years. Benign neoplasms are adenoma, oncocytoma & metanephric adenoma and angiomyolipoma [8, 9, 10].

Aims and Objectives

- To observe the spectrum of histopathological lesions in nephrectomy cases received in tertiary care hospital.
- To study the age and sex distribution and neoplastic and non-neoplastic distribution of cases along with other histologic features.

Material and Methods

- The present retrospective study w%as done for the period of 1 year and 5 months from January 2021 to may 2022 which included all the nephrectomy specimens received in the Histopathology section of department of pathology, B.J. Medical college and civil hospital, Ahmedabad, Gujarat, India.
- A total of 63 nephrectomy cases were included in this study. Nephrectomy specimens of any age and sex having non-neoplastic and neoplastic lesions that undergo histopathological examination following surgery was included in this study.
- All nephrectomy specimens were fixed in 10% formalin, specimens were inspected and gross findings and weight and dimensions were recorded. Grossing of nephrectomy specimen done and blocks were prepared by automatic tissue processor. Tissue blocks were then cut by microtome, slides were prepared and stained by H & E stain. microscopy was done to study the histological pattern of these nephrectomy specimens.

Results

The present study was included 63 nephrectomy specimens received during the period of January 2021 to may 2022. Age of patients ranged from 1 day to 90 years. Highest incidence was observed during 3rd decade (15 cases) followed by 7th decade (10 cases) and the least cases were observed in 9th decade (1 case) [Table-1]. 55.55% were men and 45.45% were women [Table-2] with male : female ratio of 1.25:1.

Table 1: Age wise distribution of nephrectomy specimens

Age distribution (years)	No. of cases	Percentage (%)
0 to 10	6	9.53%
11 to 20	2	3.17%
21 to 30	15	23.80%
31 to 40	8	12.70%
41 to 50	8	12.70%
51 to 60	8	12.70%
61 to 70	10	15.87%
71 to 80	5	7.90%
81 to 90	1	1.90%
Total	63	01100%

Table 2: Sex wise distribution of nephrectomy specimens

Sex	No. of cases	Percentage (%)
Male	35	55.55%
Female	28	44.45%
Total	63	100%

Out of 63 nephrectomy cases 38 cases were non-neoplastic and 25 were neoplastic cases [Table-3]

Table 3: Distribution of lesion in nephrectomy specimens

Lesion	No. of cases	Percentage (%)
Non-neoplastic	38	60.32%
Neoplastic	25	39.68%
Total	63	100%

Out of 38 cases of non-neoplastic lesions 23 cases were of chronic pyelonephritis. Maximum number of cases of chronic pyelonephritis were seen in age group of 21-40 years. Maximum number of cases of renal cell carcinoma were seen in age group of 61-80 years. All cases of wilm's tumor were in the patients below age of 5 years. Majority of the cases of xanthogranulomatous nephritis belongs to 40 – 70 years. [Table-4]

Table 4: Histopathological distribution of nephrectomy specimens

Histopathological findings	Numbers	Percentage (%)
Non-neoplastic	38	60.3%
Chronic pyelonephritis	23	36.50%
Xanthogranulomatous pyelonephritis	5	7.93%
Tubercular pyelonephritis	2	3.17%
Chronic glomerulonephritis	2	3.17%
Chronic non-specific inflammation	3	4.76%
Glomerulosclerosis	3	4.76%
Neoplastic	25	39.7%
Renal cell carcinoma	21	33.33%
Wilm's tumor	4	6.34%
Total	63	100%

Table 5: Histological variants of renal cell carcinoma

Histopathological variant	Numbers	Percentage (%)
Clear cell carcinoma	13	61.90%
Chrmophobe	2	9.52%
Papillary	4	19.04%
Undifferentiated	1	4.76%
Multilocular cystic RCC	1	4.76%
Total	21	100%

Table 6: Comparison between non neoplastic and neoplastic lesions in the different studies

Authors	Non neoplastic lesions (%)	Neoplastic lesions (%)
Malik EF *et al*., [17]	77.6	22.4%
Ghalayini IF [11]	70.4	29.6%
Rafique M [13]	76.6	23.4%
Badmus TA *et al*., [12]	36.7	63.3%
Datta B *et al*., [19]	60.2	39.8%
Gupta A and Bhardwaj S [15]	80	20%
Present study	60.3	39.7%

Discussion

In present study total 63 nephrectomy specimens were received in histopathology section of department of pathology, B.J. Medical college and civil hospital, Ahmedabad. Out of total 63 nephrectomy 35 patients were male and 25 patients were female with male female ratio was 1.25:1. This was similar to study done by Lathif F *et al*. [11] and Badmus *et al*. [12] who found male to female ratio of 1.9:1 and 2:1 in their studies respectively. However Rafiq *et al*. [13] found slight female preponderence in his study.

Age range of cases were from 1 day to 90 years. The highest percentage of patients belongs to 2nd and 3rd decade. There was slight similarity with study done by kotta Devendra reddy *et al*. and Dr. Ajay kumar where the maximum number of patients were in 4th decade [14, 15].

Pyelonephritis was the leading pathological entity in our nephrectomy which is compatible with the report by kubba [16], *et al*, and Malik *et al*. [17] but different from that of schiff and Glazier [18].

Renal tuberculosis is an infection worth of mentioning in India as 2 cases (5.28%) of tuberculosis were found in our study among the nephrectomies carried out for benign conditions as compared to 7.62% in the report of Rafique M. *et al*. [20] and 16.36% in report of Datta *et al*. [20]. In Kubba, *et al*. [16] and Malik *et al*. [17] there were no tuberculosis cases. Another report from Ghalayini *et al*. [21] showed that tuberculosis accounted for nine (3%) nephrectomies performed for benign conditions, whereas patients with renal tuberculosis are uncommon in developed countries.

Renal tumors in adults are increasing in incidence throughout the world, partly as a result of widespread use of cross sectional imaging modalities and ultrasonography. Both benign and malignant tumors occur in the kidney. Because of the relative rarity of benign renal tumors, it is a common practice for urologists to consider any renal mass that enhances with intravenous contrast on computed tomography (CT) scan as a malignancy. If it is localized they tend to treat such masses radically unless there is definite evidence of a benign pathology. Most common malignant tumor in adults is renal cell carcinoma (RCC) and Wilm's tumor in childhood. Rare are urothelial tumors of calyces and pelvis.

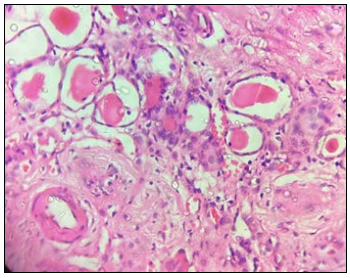

Fig 1: Chronic pyelonephritis

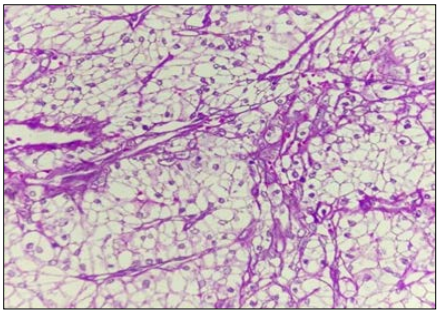

Fig 2: Clear cell renal cell carcinoma.

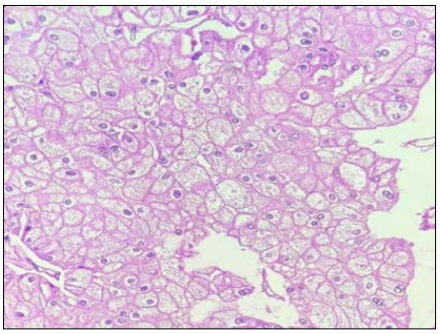

Fig 3: Chromophobe renal cell carcinoma

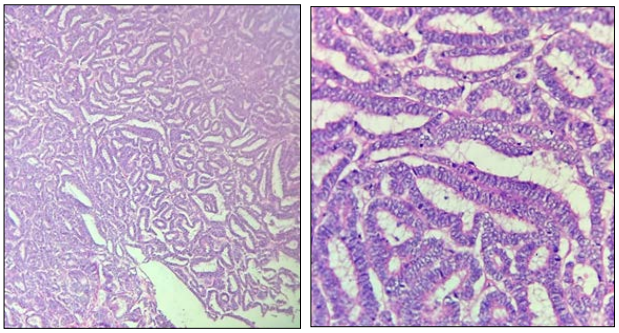

Fig 4: Papillary type renal cell carcinoma

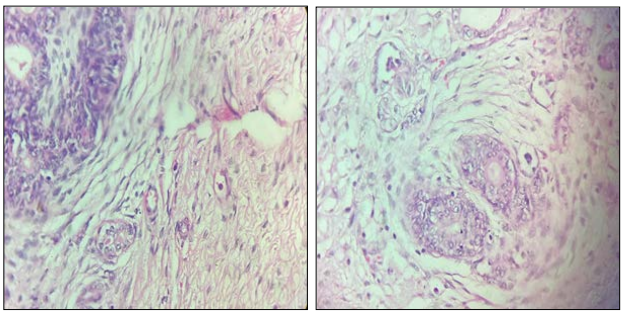

Fig 5: Wilm's tumor

Conclusion

Various pathological disease processes lead to permanent damage to kidney, for which nephrectomy is the only mainstay. Nephrectomy is an accepted surgical procedure for non functioning kidneys due to various pathological disease processes. Most common affected age group was 20-40 years. Non neoplastic lesions were the most common cause for nephrectomies. Chronic pylonephritis being the most common cause. Clear Cell renal cell carcinoma being the common among malignant tumors. Other benign and malignant lesions being rare.

Conflict of Interest

Not available

Financial Support
Not available

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