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Research Article

Nephrectomy- A Histomorphological study in a tertiary Care Centre

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ABSTRACT

Background: Kidney can be involved in various pathological processes, both neoplastic and non-neoplastic conditions, some of which may require its surgical removal-nephrectomy1. Simple nephrectomy is a common procedure in urological practice and it is indicated in patients with an irreversible damaged kidney resulting from symptomatic chronic infections, obstruction, calculus, severe traumatic injury and renal dysplasia2. RCC is not sensitive to chemotherapy and radiotherapy, and surgical resection- radical nephrectomy is recognized as a possible cure for kidney cancer 3. Radical nephrectomy (where the kidney, perinephric fat, surrounding lymph nodes, and ipsilateral adrenal gland are all removed together with the whole Gerota's fascia4. Chronic pyelonephritis with hydronephrosis is the most common type of nephrectomy specimen for non-neoplastic conditions due to increase in the incidence of Pelviureteric Junction Obstruction (PUJO) by upper ureteric calculi, whereas in the neoplastic group, Renal Cell Carcinoma (RCC) is the most common, due to increase in the incidence in chronic smokers. Most of the patients with Chronic Pyelonephritis (CPN) lead to permanent and progressive damage to the renal parenchyma ending up with nonfunctioning kidney 5.

Methods: A Cross-sectional retrospective study was conducted in the Department of Pathology, Osmania general hospital, Hyderabad, Telangana, India during January 2021 to December 2022 that evaluated 60 nephrectomy specimens along with clinical details given in case records of the patients during this period. Histopathological evaluation of both simple and radical nephrectomy specimens was done and results were analyzed.

Result: In our study a total of 60 nephrectomy specimens had been grossed and representative sections submitted for histopathological examination. Of 60 nephrectomies, 11(18.3%) were radical nephrectomies done for renal cell carcinomas and remaining 49(81.7%) cases were simple nephrectomies. On histopathological examination of total 60 nephrectomies 47(78.3%) were non-neoplastic conditions and 13(21.7%) were neoplastic.

The most common cause for nephrectomy in medical cases was chronic pyelonephritis with or without non-functioning kidney constituted about 78.9%.

Conclusion: Histopathological evaluation of nephrectomy specimens plays a vital role in revealing underlying familial cystic diseases, chronic medical and also neoplastic conditions of the kidney.

Keywords: *Nephrectomy, Chronic pyelonephritis, Renal cell carcinoma.*

INTRODUCTION

Pyelonephritis is defined as inflammation of the renal parenchyma and is derived from the Greek words 'pyelo'(pelvis), 'nephros' (kidney) and 'itis' (inflammation). It may be acute and characterised by features of inflammation and sometimes the triad of fever, costovertebral angle pain and nausea (or vomiting). It may also present as chronic

pyelonephritis(CPN) which manifests with repeated acute episodes or occurs insidiously over several years and is only discovered as end-stage renal disease (ESRD). The term CPN encompasses the not otherwise specified variants such as xanthogranulomatous pyelonephritis (XGP) and emphysematous pyelonephritis [6]. Worldwide, CPN accounts for about 4%–6% of patients requiring dialysis for ESRD. Even though incidence and prevalence data on the disease is scanty, available literature estimates that CPN occurs at a rate of about 1–2/1000 women and under 0.5/1000 males.[7,8,9]
Renal Cell Carcinoma and Wilm's tumour are commonest and nephrectomy is the treatment of choice for Renal Cell Carcinoma[4].

Surgical pathologists should be aware of the importance of both correctly classifying the underlying renal neoplasm and the concomitant non-neoplastic kidney that is likely to be present in these specimens[10].
H & E sections allow the counting of the number of glomeruli, general evaluation for ascertaining the percentage of cortex and medulla, cellular characteristics, type of inflammation and to locate the area of interest i.e., whether the disease affects the glomerulus, interstitium, vessels or tubules. Special stains commonly used are PAS, Silver methenamine, Masson's trichrome and Congo red [11,12].

Our aim of the study is to assess the pattern of renal pathology detected in nephrectomy specimens of patients undergone the surgery in our tertiary care institute from 2021 to 2022.

MATERIALS AND METHODS

The present study was conducted in the Department of pathology, Osmania Medical College, Hyderabad on nephrectomy specimens during the period of January 2021 to December 2022.

Study design

Cross-sectional retrospective study.

Study period

The present study was conducted during January 2021 to December 2022.

Method of collection of data

Source of Data

Case records of patients who have undergone simple and radical nephrectomies in our tertiary care centre.

Sample size

60 Nephrectomies.

Sampling procedure

Data collected and compiled from the case records of patients who have undergone nephrectomy in our urology Department of Osmania general Hospital, Hyderabad.

Selection criteria

Inclusion Criteria

1. Patients with age more than or equal to 5 years and less than or equal to 80 years.
2. Patients who have undergone simple and radical nephrectomy.
3. Patients who had complete case records.

Exclusion Criteria

1. Patients with age less than 5 years and more than age of 80 years.
2. Patients with inadequate data.

Procedure

The study was approved by the Ethical and Research Committee of Osmania general Hospital, Hyderabad for retrospective evaluation of patient case records and histopathological records. All the relevant data had been tabulated in Excel sheet and statistically analysed.

RESULT

In our study a total of 60 nephrectomy specimens had been grossed and representative sections submitted for histopathological examination. Of 60 nephrectomies, 11(18.3%) were radical nephrectomies done for renal cell carcinomas and remaining 49(81.7%) cases were simple nephrectomies.
The minimum age for nephrectomy was 8 years and maximum age was 75 years with mean age of 45.9 years in our study. The indication at age of 8 years for nephrectomy was found to be polycystic kidney disease in our study.
Of total 60 nephrectomies done 34 (56.6%) were females, 26 (43.4%) were males with male to female ratio of 1: 1.3.
Of 60 cases who have undergone nephrectomy 3 (5%), 2(3.3%),
3(5%) had shown history of Hypertension, Diabetes and hematuria respectively.

History of flank pain and renal calculi were predominantly seen in our study with 13(21.6%) and 15(25%) respectively.
Of 60 nephrectomy specimens received to our department Right side nephrectomies were 35(58.4%) and remaining 25(41.6%) were left.

On gross examination the minimum length of nephrectomy specimens received was 2.5 cm and maximum was 20 cm with mean length of 10.4 cm. The breadth observed was minimum 1.5 cm and maximum 16.5 cm and mean breadth was 5.3 cm. The nephrectomy with maximum dimensions was found to be of polycystic kidney with end stage renal disease. When we examined the weight the maximum was 520 gms and the minimum was 90 gms with a mean of 190.8 gms. On cut section 17(28.3%) out of 60 had cystic change and remaining 43(71.3%) were solid in appearance. Corticomedullary differentiation was lost in 43(71.6%) cases out of 60 nephrectomies examined.

On histopathological examination of total 60 nephrectomies 47(78.3%) were non-neoplastic conditions and 13(21.7%) were neoplastic.

Table 1: Showing details of non-neoplastic conditions

Diagnosis	Number	Percentage
Polycystic kidney disease	1	2.1%
Chronic pyelonephritis	5	10.6%
Chronic pyelonephritis with non functioning kidney	32	68.3%
Hydronephrosis	1	2.1%
Hypoplastic kidney	1	2.1%
Xanthogranulomatous pyelonephritis	4	8.5%
Chronic tubulointerstitial nephritis	1	2.1%
Crystal induced nephropathy	1	2.1%
Renal dysplasia	1	2.1%
Total	47	100%

Table 2. showing neoplastic conditions

Diagnosis	Number	Percentage
MALIGNANT(RCC)-11(18.3%)		
Clear cell RCC	7	63.8%
Papillary RCC	2	18.1%
Sarcomatoid/Mesenchymal RCC	2	18.1%
Total	11	100%
BENIGN-2(3.3%)		
Angiomyolipoma	2	100%
Total	2	100%

Table 3. Prevalence of non- neoplastic pathologic abnormalities

	Present	Absent
INTERSTITIAL		
Chronic inflammation	43(91.4%)	4 (8.6%)
Interstitial fibrosis	12(25.5%)	35(74.5%)
Calcification	3(6.3%)	40(93.7%)
Thyroidization	16(34%)	31(66%)
Tubular atrophy	8(17%)	39(83%)
GLOMERULAR		
Glomerular sclerosis	30(63.8%)	17(36.2%)
Glomerular atrophy	7(14.8%)	40(85.2%)
VASCULAR		
Arteriosclerosis	35(74.4%)	12(25.6%)

Table 4. Age wise distribution of Nephrectomy specimens

Age group	Number of cases	Percentage
0-10	2	3.3 %
11-20	2	3.3%
21-30	10	16.6%
31-40	9	15%
41-50	10	16.6%
51-60	18	30%
61-70	8	13.6%
71-80	1	1.6%
Total	60	100%

Table 5. Gender wise distribution of non-neoplastic and neoplastic lesions

	Non neoplastic	Neoplastic
Males	21	5
Females	26	8
Total	47	13

DISCUSSION

In the present study out of 60 cases of nephrectomies studied the cases which have undergone nephrectomy for medical cause were 47(78.3%) versus 13(21.7%) cases were done for surgical cause mostly renal cell carcinoma.

The most common cause for nephrectomy in medical cases was chronic pyelonephritis with or without non-functioning kidney constituted about 78.9%. This was found to be quite high when compared to Ademola et al study conducted during the period 2010-2017 where it accounted for 29% of all nephrectomies done secondary to CPN[13].

In surgical cases in our study RCC was most common indication for nephrectomy which accounted for 21.7% of all nephrectomies which was found in concordance with study done by B.M.Soumya et al during 2017-2022, which showed the percentage of RCC in nephrectomies done constituted 25%[14].

The high incidence of patients undergoing nephrectomy was found to be in the age group of 51-60 years in our study. This was concordant with study done by B.M.Soumya et al[14]. In our study female preponderance was seen with male to female ratio of 1:1.3 which was in concordance with study conducted by Gulshan Kumar Mukhiya et al. in the period between 2015-2020, in that study the male to female ratio was 0.98:1[15].

Among all the nephrectomies done the most common presenting feature in our study was calculus 25% , flank pain 21.6%, hematuria 5% which was in contrast to study done by Shubha et al conducted during 2018-2020 which showed flank pain as the most commonest presenting feature[16].

Of total 60 nephrectomies studied 58.4% were right sided nephrectomies. The mean length of nephrectomy specimens in our study was 10.4 centimeters and mean breath was 5.3 centimeters with maximum length ranging up to 20cm of a specimen of polycystic kidney.

On gross examination loss of corticomedullary differentiation was seen in 85% which was quite higher when compared to Gulshan Kumar Mukhiya et al study where it was 64.7%[15].

On histopathological examination of non-neoplastic nephrectomies the most common histological finding was interstitial inflammation (91.4%) followed by glomerulosclerosis (63.8%). In Nathan et al study done during 2009-2013 interstitial inflammation was most common finding followed by interstitial fibrosis[17]. Among the non-neoplastic causes of nephrectomy xantho-granulomatous pyelonephritis the second most indication for nephrectomy in our study.

Globally the incidence of xantho-granulomatous pyelonephritis is 0.6% -1% with female preponderance. But different studies had shown to be more than the global incidence. In the study conducted by Aiman A et al the incidence of xanthogranulomatous pyelonephritis was 5.7% and, in the study, conducted by Rafique et al it was 1.29%.

In our study it was 8.5% higher than those studies[18]. In our study we found one case of Adult polycystic kidney with incidence of 2.1% which was concordant with Shireen Hamid et al study which also showed 2% [19].

CONCLUSION

Approach to renal pathology conventionally is to classify in to medical kidney or surgical kidney and if it is medical kidney mostly we expect biopsy evaluation and grading severity of the disease, where as in surgical kidney we expect cystic disorders or neoplastic conditions but histopathological evaluation of nephrectomy specimens play a vital role in revealing underlying familial cystic diseases, chronic medical and also neoplastic conditions of the kidney.

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