



A RETROSPECTIVE ANALYSIS OF HISTOPATHOLOGICAL SPECTRUM OF LESIONS IN NEPHRECTOMY SPECIMENS IN A TERTIARY CARE CENTRE

Urology

K.Sitharamaiah	Associate Professor, Department of Urology, Kurnool Medical College, Kurnool
K.Anusha*	Senior Resident, Department of Pathology, Kurnool Medical College, Kurnool*Corresponding Author
G.Raja Sekhar	Senior Resident, Department of Urology, Kurnool Medical College, Kurnool
A.Bhagavan	Professor & HOD, Department of Urology, Kurnool Medical College, Kurnool
G.Baleswari	Professor & HOD, Department of Pathology, Kurnool Medical College, Kurnool

ABSTRACT

Background: Kidneys can be involved in various pathological processes. Nephrectomy is a common procedure in urological practice. Indications for nephrectomy can display geographical differences in different countries around the world with different urological causes. The aim of the study was to analyse the various lesions in nephrectomy specimens in a tertiary care hospital in Kurnool, Andhra Pradesh, South India and also to know the frequency of lesions according to the age, gender and histology. **Materials and Methods:** It is a retrospective study, done over a period of 13 years from June 2007 to March 2020 which included 132 nephrectomy cases. Patient information such as age, gender, clinical diagnosis, radiological data such as USG and CT results, gross morphology and microscopic data were recorded from the available data. **Results:** Of 132 nephrectomy specimens, 55 (41.66%) were males and 77 (58.34%) were females. The mean age was 40.46 years. 99 (75%) nephrectomy specimens showed - non-neoplastic lesions and 33 (25%) showed neoplastic lesions. The most common non-neoplastic lesions were chronic pyelonephritis in 62 (46.96%) patients, followed by tuberculous pyelonephritis in 20 (15.15%) patients. RCC (n = 27) was the most common neoplastic lesion. **Conclusion:** Chronic pyelonephritis remains the most common non-neoplastic cause of nephrectomy. RCC is the most common neoplastic cause of nephrectomy. Tuberculosis has a high incidence in developing countries. Awareness of renal TB is required for the physicians, to suspect this disease in patients with unexplained urinary tract abnormalities, particularly in those with any immunosuppression and those coming from TB-endemic areas.

KEYWORDS

Nephrectomy; Chronic Pyelonephritis, Renal cell carcinoma, Tuberculous pyelonephritis

INTRODUCTION

A wide range of benign and malignant pathologies arise from various components of the renal parenchyma, notably tubular epithelium.[1] Nephrectomy is a common surgery, indicated for many of these pathologies. Simple nephrectomy is recommended for patients with irreversibly damaged kidney resulting from symptomatic chronic infections, obstruction, calculus disease, vesicouretric reflex, congenital dysplasia, nephrosclerosis, cystic disease, dysplasia's and severe traumatic injury.[2]

Radical nephrectomy is the treatment of choice for malignant tumors. Renal tumours include a wide variety of neoplastic lesions with patterns that are relatively distinct for children and adults[3-5]. Renal tumors are the 13th most common malignancy, worldwide. [6]. 99 percent of renal neoplasms are malignant, the most common being renal cell carcinoma and Wilm's tumor. [7].

Worldwide, indications for nephrectomy in different countries can display geographical differences with different urological causes. The objective of this study is to observe the continuum of histopathological lesions in nephrectomy cases performed in our department. We also analyzed the age and sex distribution, neoplastic and non-neoplastic distribution of cases along with other histomorphologic characteristics. Ours is a tertiary care center serving both urban and rural communities in the southern part of India.

MATERIALS AND METHODS

The present study was conducted in the Department of Urology in collaboration with the Department of Pathology, Government Medical College, Kurnool, Andhra Pradesh, which is a tertiary care centre. This is a retrospective study done over a period of 13 years from June 2007 to March 2020. A total of 132 cases of nephrectomy specimen were studied during this period. All nephrectomy cases were taken out from the records of the department and reviewed. Patient particulars were noted in detail on proformas, which included age, sex, and clinical findings; investigations such as CT scan, USG, and other relevant investigations including isotope renal scan were also recorded. Intra-operative findings and gross findings of nephrectomy specimens were noted. The tissue was processed as per standard practice; 4- to 5- μ m-thick sections were cut using a rotary microtome. Special stains and immunohistochemistry was also performed where appropriate.

RESULTS

In the present study, total 132 patients underwent nephrectomy. Of these 132 patients, 117 were adults and 15 were paediatric patients. Mean age of the patients in the present study is 40.46 years. The youngest patient's age was 5 months old and the oldest was 80 years old. Most common affected age group was 51 – 60 years age group with 27 cases contributing 20.45% of total cases. (Table. 1) 55 (41.66%) patients were male and 77 (58.34%) patients were female; with the male to female ratio of 1:1.4. (Table. 2)

99 (75%) cases were non-neoplastic and 33 (25%) cases were neoplastic. Among the non-neoplastic diseases leading to nephrectomies, most common pathology was chronic pyelonephritis noted in 62 cases (46.96%). In neoplastic lesion, most common were renal cell carcinoma noted in 27 cases (20.45%). (Table. 3)

Table 1: Age-wise distribution of nephrectomy specimens

Sl.No.	Age group	No of patients	Percentage
1	0 - 10	11	8.33
2	11 - 20	8	6.06
3	21 – 30	26	19.69
4	31 – 40	20	15.15
5	41 – 50	25	18.93
6	51 – 60	27	20.45
7	61 – 70	11	8.33
8	71 - 80	4	3.03

Table 2: Gender-wise distribution of nephrectomy specimens

Sex	Number	Percentage
Male	55	41.66
Female	77	58.34

21-30 years (n = 25) followed by 31-40 (n = 20) were the most common age groups involved in non-neoplastic lesions. The neoplastic lesions were most commonly noted in the age group of 51–60 years (n = 16) followed by 41–50 (n = 9). Majority of cases of chronic pyelonephritis were seen in the age group of 21-40 years (n=37). 20 cases of tuberculous pyelonephritis were noted, with maximum cases noted in the age group of 21-40 years.

Table 3: Distribution of nephrectomy specimens according to histopathological lesions

Sl.No.	Lesion	No of patients	Percentage
1	Chronic Pyelonephritis (CPN)	62	46.96
2	Renal cell carcinoma	27	20.45
3	Tuberculous pyelonephritis	20	15.15
4	Hydronephrosis with CPN	9	6.81
5	Xanthogranulomatous Pyelonephritis	3	2.27
6	Hydatid cysts	3	2.27
7	Pyonephrosis	2	1.51
8	Wim's tumor	2	1.51
9	Squamous cell carcinoma of pelvis	1	0.75
10	multi-cystic nephroma	1	0.75
11	Renal sarcoma	1	0.75
12	Congenital mesoblastic nephroma	1	0.75

DISCUSSION

Kidneys can be affected by both neoplastic and non-neoplastic conditions, that can lead to nephrectomy. This present study consist of 132 nephrectomies cases which were analysed. In the present study maximum cases were noted in the age group of 51-60 years. This was in concordance with the studies by Gupta et al[8] and Kathirvelu S[9].

Males accounted for 55 cases (41.66%) and females accounted for 77 cases (58.34%) with a M:F ratio of 1:1.4. Similar findings were observed in studies performed by Rafique M [10] and Aiman et al [11]. However male preponderance was observed in the studies done by Lathif F [12] and Badmus TA [13].

In the present study, CPN (46.96%), followed by RCC (20.45%), were the most common indications for nephrectomy. CPN was recorded as the most common indication in the studies done by Popat VC et al[14], Thaker BD et al[15] and Gupta et al[8]. Despite the advent of newer and more effective antibiotics, chronic pyelonephritis and its variants continue to be the leading cause of nephrectomy in developing countries.

In our study, a total of 33 (25%) neoplastic lesions were observed, of these majority i.e. 27 cases (20.45%) were RCC. This was in concordance to the findings of Gupta et al [8] and Rafique et al [10] who reported that majority of malignant neoplasms of kidney were Renal Cell Carcinoma. In the present study most common histological type was clear cell carcinoma.

Primary squamous cell carcinoma rarely presents in the upper urinary tract. Li et al [16] and Blacher et al [17] reported very low incidence of renal squamous cell carcinomas among malignant renal tumors, in the range of 0.5-0.8%. Accordingly, we also came across only one case of primary squamous cell carcinoma which was noted arising from renal pelvis.

Chromophobe cell carcinoma is a rare renal tumor with different histochemical, ultrastructural and genetic features. It accounts for 5% of renal cell carcinoma [18]. We had a case of chromophobe cell carcinoma in a 55 years female who presented with hematuria and mass in the abdomen. CT scan showed renal cell carcinoma with rupture causing perinephric hematoma. Grossly the tumor was solitary, circumscribed, grey tan with areas of necrosis and perinephric hematoma collection (Fig 1) (Fig 2).

Spontaneous perirenal haemorrhage is an uncommon entity. Rupture could occur due to tumoral invasion of capsular or vascular structures or due to tension as a result of increased renal venous pressure caused by tumor invasion or due to necrosis caused by the growth of the tumor. These patients should be managed in an emergency approach, to decrease morbidity and mortality.

In our study, a case of multi-cystic nephroma was seen in a 33 year female, who presented with mass abdomen. It is a rare benign cystic lesion of kidney. These tumors usually presents as unilateral multicystic renal mass without solid elements (Fig 3) (Fig 4). Although the histological characteristics of cystic nephroma are well described, gross similarities with other renal cystic tumours and partcularly with cystic renal cell carcinoma can cause confusion in the

diagnosis and discrepancies in the treatment of this lesion.

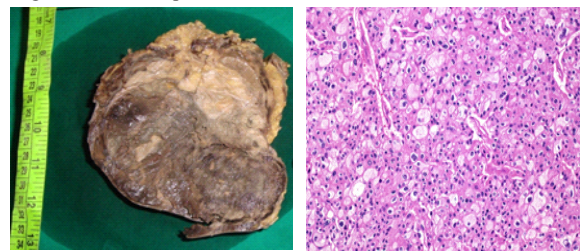


Figure 1: Gross photograph of chromophobe cell carcinoma
Figure 2: Photomicrograph of chromophobe cell carcinoma



Figure3: Gross photograph of multi-cystic nephroma
Figure4: Photomicrograph of multi-cystic nephroma

There is a worldwide increase in extrapulmonary tuberculosis, especially in countries with a high prevalence of pulmonary tuberculosis. 30-40 percent of extrapulmonary cases are caused by urogenital tuberculosis, second only to lymph node involvement. [19]. In the present study there were 20 (15.15%) cases of tuberculous pyelonephritis. No other study had such high incidence of TB cases (Table 4). This could be due to geographical variation, where Tuberculosis is endemic in southern India. Also the low socio-economic status of the patients could be the reason for delay in the diagnosis and management of renal tuberculosis. High index of suspicious of tuberculosis should be kept in mind while managing patients with non-functioning kidneys. Also these tuberculosis patients should be diagnosed in the early stages and should be properly followed to prevent complications and further preventing progression of kidneys into non-functioning status. Hence, there is a need to emphasize the importance of early diagnosis and proper management of urogenital tuberculosis.

Table 4: Comparison of incidence of Tuberculosis among various studies

Study	No of patients	Percentage
Thaker et al [15]	1	1.4
Shanmugasamy. K et al.[9]	2	8.5
Popat VC et al[14]	4	5.12
Rafique M et al.[10]	9	7.6
Present study	20	15.15

In the present study there were 3 (2.27%) cases of Xanthogranulomatous Pyelonephritis. Similar incidence was observed in the studies by Gupta et al [8] Popat VC et al [14]. Xanthogranulomatous pyelonephritis is an uncommon, distinct, and aggressive type of chronic pyelonephritis and if uncontrolled it spreads to neighboring tissues and destroys it. Almost always, urinary obstruction was present and was caused by renal stones.

In the present study there were 3 (2.27%) cases of Hydatid cysts. Hydatid disease involving kidney is extremely rare, accounting only 2-3% of all cases. Primary renal involvement without liver and lung involvement is much more uncommon. Ameur et al has recorded the largest series of renal hydatid, including 34 cases [20]. In general, surgery is the treatment of choice in renal hydatid cyst affecting the whole kidney with the destruction of renal parenchyma.

In the present study, 15 paediatric patients underwent nephrectomy. Non-functioning kidneys secondary to PUJ obstruction was the most commonly noted etiology, constituting 9 cases (6.81%). 2 case of Wilms tumor, were noted in 5 and 8 months old children. Wilms tumor is the most common noted childhood malignant renal tumor.

One case of congenital mesoblastic nephroma has been registered. It is

a rare tumor with an estimated incidence of approximately 8/million in children under 15 years of age. Similar to uterine leiomyoma, the lesion has a gross and histologic presentation, but consists of immature renal stromal cells. (Fig 5)(Fig 6). The tumor also lacks renal blastema and neoplastic metanephric components, thus differentiating it from Wilms tumor. Almost always, CMN has a favourable prognosis. Therefore, CMN needs to be properly diagnosed and differentiated, primarily histologically, from other pediatric neoplasms.

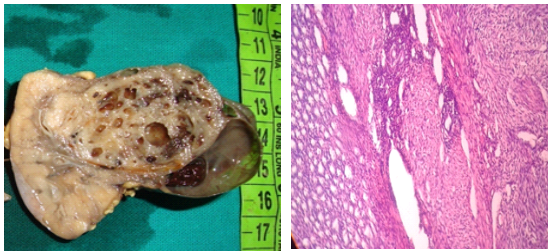


Figure 5: Gross photograph of mesoblastic nephroma

Figure 6: Photomicrograph of mesoblastic nephroma

Primary sarcomas represents only 1-2% of malignant renal tumors and are usually detected as incidental tumors [21]. In the current study, one case of renal sarcoma was observed in a 12-year-old girl presenting with loin pain (Fig 7)(Fig 8).

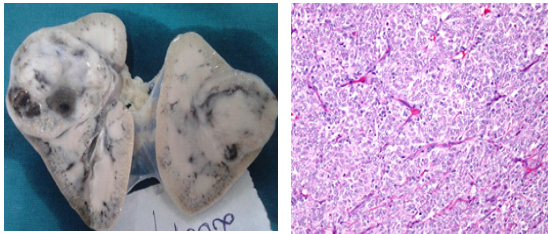


Figure 7: Gross photograph of Renal sarcoma

Figure 8: Photomicrograph of Renal sarcoma

CONCLUSIONS

The current study provides insight into histological spectrum of lesions in nephrectomy specimens in our institution. It represents the disease pattern of this region. There were more non-neoplastic lesions than neoplastic lesions. The most common non-neoplastic lesion being chronic pyelonephritis. In developing countries, improved treatment modalities for these inflammatory kidney lesions can minimize nephrectomy rates. There is a high prevalence of Tuberculosis in developing countries. There is a worrisome under-diagnosis of renal TB, contributing to the development of renal insufficiency, which can be prevented with correct and early specific therapy. The level of suspicion for this subtle and extremely morbid disease should be increased for all immunosuppressive patients and patients from TB endemic areas. Further research is required to identify the various patterns of clinical presentations of renal TB, as well as to develop more efficacious diagnostic modalities and less toxic anti-TB drugs.

REFERENCES

- Alpers CE. The Kidney. In: Kumar V, Abbas AK, Fausto N, Aster JC, editors. Robbins and Cotran pathologic basis of disease. 8th ed. Philadelphia: WBSaunders, 2010;pp 905-70.
- Ghalayini IF. Pathological spectrum of nephrectomies in a general hospital. Asian J Surg 2002;25:163-9.
- Gudbjartsson T, Hardarson S, Petursdottir V, Thoroddsen A, Magnusson J, Einarsson GV. Histological subtyping and nuclear grading of renal cell carcinoma and their implications for survival: a retrospective nation-wide study of 629 patients. Eur Urol 2005;48: 593-600.
- Renshaw AA. Sub classification of renal cell neoplasm's: an update for the practicing pathologist. Histopathology 2002; 41: 283-300.
- Eble JN, Sauter G, Epstein JI, Sesterhenn IA, eds. Pathology and genetics of tumours of the urinary system and male genital organs. Lyon, France: IARC Press; 2004.
- Ferlay J, Shin HR, Bray F, et al. Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. Int J Cancer 2010;15:2893-917.
- Ozen H, Colowick A, Freiha FS. Incidentally discovered solid renal masses: What are they? Br J Urol 1993;72:274-6.
- Gupta, A. (2020). Histopathological spectrum of lesions in Nephrectomy specimens in a tertiary care hospital in North India. journal of medical science and clinical research, DOI:10.18535/jmscr/v8i2.144.
- Kathirvelu S, Rajvaithy A, KV, Kotasthane D. Histopathological spectrum of Nephrectomy specimen in a tertiary care centre: with an emphasis on Chronic Pyelonephritis. Annals of Pathology and Laboratory Medicine. 2017; 4(5): 573-578.
- Rafique M. Nephrectomy: Indications, complications and mortality in 154 consecutive patients. J Pak Med Assoc 2007; 5: 35-8.
- Aiman A, Singh K, Yasir M. Histopathological spectrum of lesions in nephrectomy specimens: A five-year experience in a tertiary care hospital. J Sci Soc 2013;40:148-54.
- Lathif F, Mubarak M, Kazi JI. Histopathological characteristics of adult renal tumours: a preliminary report. J Pak Med Assoc 2011; 61: 224-8.
- Badmus TA, Salako AA, Sansui AA et al. Adult nephrectomy: our experience at Ile-Ife. Niger J Clin Pract 2008; 11(2): 121-6.
- Popat VC, Kumar MP, Udani D, Mundra MP, Vora DN, Porecha MM. A Study On Culprit Factors, Ultimately Demanding Nephrectomy. The Internet Journal of Urology. 2009; 7(1): 1-8.
- Thaker BD, Singh K.A Histopathological Review of Nephrectomy Specimens Received in a Tertiary Care Hospital-A Retrospective Study. Journal of Medical Science And clinical Research. 2017; 05(06): 23807-23810.
- Li MK, Cheung WL. Squamous cell Carcinoma of the renal pelvis. J Urol 1987;138:269-71.
- Blacher EJ, Johnson DE, Abdul Karim FW. Squamous cell Carcinoma of renal pelvis. Urology 1985;25:124-6.
- Baharzadeh F, Sadeghi M, Ramezani M. Chromophobe renal cell carcinoma or oncocytoma: a manner of challenge in Frozen section diagnosis. 2019;9(1):41-4.
- Andre AvareseFigueiredo, Antonio MarmoLucon, Renato FalciJunio, Miguel Srougi. Epidemiology of urogenital tuberculosis worldwide. International Journal of Urology 2008;15:827-832.
- Ameur A, Lezrek M, Boumdin H, Touiti D, Abbar M, Beddouch A. Hydatid cyst of the kidney based on a series of 34 cases. Progres en Urologie: Journal de L'association Francaise D'urologie et de la Societe Francaise D'urologie. 2002 Jun 1;12(3):409-14.
- Kavantzias N, Pavlopoulos PM, Karaitianos I, Agapitos E. Renal leiomyosarcoma: Report of three cases and review of the literature. Arch Ital Urol Androl 1999;71:307-11.