 DOI: 10.18231/2581-3706.2019.0007

Histopathological study of nephrectomy specimens in a tertiary care hospital

Nilay Shah[1], Sunita Goyal[2,*]

[1,2]Assistant Professor, [1,2]Dept. of Pathology, [1,2]GMERS College, Himmatnagar, Gujarat, India

***Corresponding Author: Sunita Goyal**
Email: drsunitagoyal@gmail.com

Abstract

Introduction: Like any other human organ, kidney also may be involved by many inflammatory, benign or malignant diseases which require removal of kidney. 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.

Materials and Methods: The materials for the study were collected from the patients being admitted in a tertiary care hospital situated in Ahmedabad affiliated with Gujarat University. Data were collected in pretested proforma.

Results: Total 74 cases of nephrectomy specimen were studied. The data according to age incidence, sex incidence, location, nature of the lesion and clinical symptoms was prepared and analyzed. 55 (74.33%) cases were of benign lesions while 19 (25.67%) cases were of malignant lesions. We found 6 cases of congenital kidney diseases, among which maximum cases were of multicystic renal dysplasia (50%), followed by bilateral renal dysplasia, horse shoe kidney and duplex kidney (16.66% each).

Conclusion: Most common benign lesions were Chronic inflammatory causes, renal calculus related hypofunctioning kidneys, trauma and congenital diseases of kidney. Angiomyolipoma and Cystic nephroma were most common benign neoplasm while renal cell carcinoma, Wilm's tumor and urothelial carcinoma were most common malignant neoplasm.

Keywords: Nephrectomy specimen, Benign, Malignant, Congenital lesion.

Introduction

Like any other human organ, kidney also may be involved by many inflammatory, benign or malignant diseases which require removal of kidney. Simple nephrectomy is done to remove the permanently damaged, not working kidneys involved by different benign pathological conditions like extensive renal calculous, obstruction in ureter, or at pelviureteric junction (PUJ), On the other hand, radical nephrectomy is indicated in malignant lesion. A wide variety of both benign and malignant tumors are found in kidney.[1] 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.[2] 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.[2]

In the recent time, there has been a growing interest on kidney saving surgery or partial nephrectomy to treat localized malignant lesion by laparoscopic approach.[3] In the developed countries, laparoscopic procedures have outperformed open nephrectomy procedures.[4] But in our country, in many centers, especially those in rural or semi-urban setup, we have been performed open nephrectomy procedures.

Material and Methods

Source and Method of collection of data

This was a three and a half year study conducted in histopathology section of Department of Pathology, NHL Municipal medical college Ahmedabad from June 2009 to October 2012. All patients who visited the Surgery/Urology outpatient department and presenting with haematuria, dysuria etc., were included in the study. Simple or radical nephrectomies were performed as and when indicated. During the chosen study period total of 74 patients went under nephrectomy.

Nephrectomy specimens were received and fixed in 10% buffered formalin. Grossing of nephrectomy specimens was done according to the standard protocol.[5] Representative tissue were taken and processed for paraffin embedding, haematoxylin and eosin (H and E) stained and examined by the pathologists. Special stains (modified Z.N. stain and PAS stain) were done whenever required. Pathological staging was performed with the 2002 TNM classification[6] and histological subtyping was performed by the 2004 WHO classification.[7] Each tumor was graded according to the Fuhrman nuclear grading system.[8]

Sample size

All the nephrectomies which were done in our hospital from June 2009 to October 2012 were part of our study.

Results

A total of 74 patients underwent nephrectomy during the three and half year period. Age of the patients were ranging from 1 day to 80 years (mean age 38.34±22.28years)

Table 1: Distribution of neoplastic and non neoplastic lesions by age and sex

Age (yrs)	Benign and Malignant Lesion		Non neoplastic lesions		Total	Percentage (%)
	Male	Female	Male	Female		
0-1	1	0	3	2	6	8.11%
01-10	2	1	3	2	8	10.81%
11-20	0	0	2	3	5	6.75%
21-30	1	0	5	0	6	8.11%
31-40	0	1	6	3	10	13.51%
41-50	1	2	9	3	15	20.27%
51-60	3	7	5	2	17	22.97%
61-70	2	0	1	1	4	5.40%
>70	1	1	1	0	3	4.05%
Total	**11**	**12**	**35**	**16**	**74**	**100%**

Maximum nephrectomies were done in age group51-60 years (17 cases; 22.97%). Also nephrectomies for malignant lesions were highest in this age group (7 cases; 36.84%).

Table 2: Sex predilection in neoplastic and non neoplastic lesions

No. of nephrectomy cases (%)	Male	Female
Total no. of cases =74(100%)	46	28
Neoplastic conditions = 23(31.1%)	11	12
Benign Neoplasm(4)	0	4
Malignant Neoplasm (19)	11	8
Non neoplastic conditions =51(68.9%)	35	16

Out of 74 nephrectomy specimens, Male Female ratio was 1.63:1

35 (47.29%) kidneys removed were from the left side while 37 (50%) kidneys were of right side from total cases of 74 [Table 3]. One case of bilateral kidneys were removed for renal dysplasia. In another case horse shoe kidney was the indication for nephrectomy.

Table 3: Histopathological diagnosis

Diagnosis	No. of patients	Percentage (%)
Benign conditions	55	74.33%
Congenital	6	7.89%
Inflammatory	39	52.70%
Traumatic	6	7.89%
Benign neoplasms	4	5.40%
Malignant neoplasms	19	25.67%
Total	**74**	**100%**

Out of 74 cases, 55 (74.33%) cases were of benign conditions while 19 (25.67%) were of malignant conditions of the kidney [Table 3].

Within the non neoplastic lesions, 39 cases were of Chronic inflammatory lesion followed by trauma (6 cases) and congenital diseases of kidney (6 cases).

Within malignant lesion Renal cell carcinoma (14 cases;73.68%) was the most common etiology.

Among the 4 cases of benign neoplasms 3 (75%) cases were of Angiomyolipoma and 1(25%) case was of Cystic nephroma.

We found six cases of congenital kidney diseases, among which maximum cases were of multicystic renal dysplasia(3 cases; 50%), followed by bilateral renal dysplasia, horse shoe kidney and duplex kidney one case each(16.66%).

Table 4: Histological Types of Renal Cell Carcinoma (RCC)

RCC Types	Observations	Percentage (%)
Clear cell RCC	8	57.14%
Papillary RCC	2	14.29%
Chromophobe RCC	3	21.42%
Multilocular cystic RCC	1	7.14%
Total	**14**	**100%**

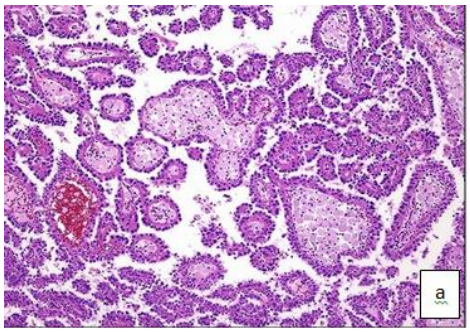
Conventional (clear cell) Renal cell carcinoma was the leading variant of Renal cell carcinoma in our study (8 cases; 57.14%). We found 3 cases(14.29%) of Chromophobe type; and 2 cases(14.29%) of Papillary Renal cell carcinoma and 1 case of multilocular cystic Renal cell carcinoma.

Table 5: Histopathologic Characteristics of 8 cases of Clear Cell Renal cell carcinoma

Histopathologic Characteristics	No. of Clear cell RCC cases	Percentage (%)
Capsular Invasion	3	37.5%
Renal Vein Invasion	2	25%
Renal Sinus Invasion	2	25%
Perinephric fat invasion	2	25%
Fascia of Gerota invasion	1	12.25%
Staging		
pT1	3	37.5%
pT2	2	25%
pT3	2	25%
pT4	1	12.25%
Fuhrman's Nuclear grading		
Grade I	1	12.25%
Grade II	5	62.5%
Grade III	1	12.25%
Grade IV	1	12.25%

The main pathologic prognostic parameters which are important in Clear Cell RCC, are mention in Table-5.The maximum diameter of primary tumor was 16 cm, as seen in 1 case (12.25%) and the least 1.5 cm, seen in 1case (12.25%). Capsular invasion was seen in 3 cases (37.5%). Renal vein invasion was seen in 2(25%) cases, while renal sinus invasion present microscopically in 2(25%) cases. Involvement of perinephric fat was observed in 2 cases (25%) While Fascia of Gerota was involved in one case (12.25%) only. Lymph nodes were received in 3(37.5%) cases. Lymph node metastases were not present in any case.

Among 8 cases of Clear Cell RCC, one case (12.25%) is of grade I, 5 cases (62.5%) are of grade II, one case (12.25%) is of grade III and one case (12.25%)is of grade IV.



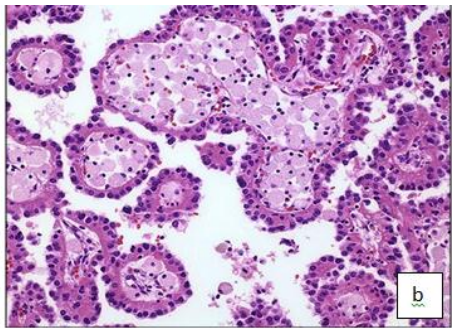
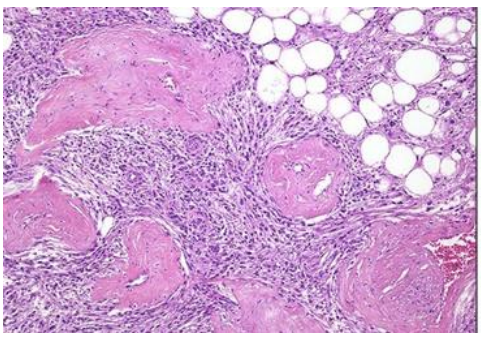


Fig 1: Papillary Renal cell carcinoma: H and E stain (10x), Fig 2: Papillary renal cell carcinoma: H and E stain (40x)



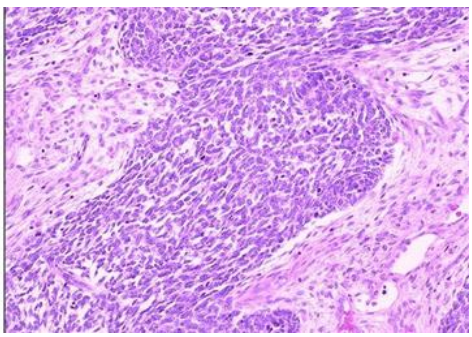


Fig. 3: Angiomyolipoma of Kidney_showing angio adipose tissue, smooth muscle, and thick-walled blood vessels H & tain, Fig. 4: Wilm's tumor: H & E stain (40x)

Discussion

There is definitely a geographic disparity regarding the indications of nephrectomy. In our study, there is a much higher rate of nephrectomy performed for non neoplastic conditions of the kidney compared to developed country. In our present series of 74 nephrectomies performed during the study period of three and half years, 74.33% cases were performed for benign conditions whereas 25.67% cases were performed for malignant diseases of the kidney. which is comparable with the series reported from developing countries.

Table 6: Incidence of benign V/S malignant lesions

Various Studies	Benign lesions (%)	Malignant lesions (%)
Nigeria(Eke N.Echem)[9]	32.70	67.30
Norway(Beisland C.)[10]	32.00	68.00
Korea(Badmus TA)[11]	42.88	57.12
Philips et al[12]	24.70	75.30
Sudan(Ghalayini et al)[13]	70.00	30.00
Saudi Arabia(Malik et al)[14]	77.60	22.40
Pakistan(Rafique M. et al)[15]	76.60	23.40
India(Darjeeling,Datta et al)[16]	60.20	39.80
Present study	74.33	25.67

Out of total 74 nephrectomies 46 (62.1%) patients were male and 28 (37.9%) were females (Male: Female ratio 1.63:1). Male:female ratio was comparable to Eke N.et al,[9] Mahesh Kumar et al,[17] Fauzia Latif et al,[18] Datta et al.[16] In Rafique M. et al[15] series male female ratio was 1:1.06. [Table 6] Age of the patients ranged from 1day to 80 years (Mean age 38.34±22.28 years).

Pyelonephritis was the leading pathological entity in our nephrectomies (52.7%), which is compatible with the report by Kubba, et al,[19] and Malik et al[14] but different from that of Schiff and Glazier[20]. In these latter studies, RCC and TCC combined were the leading pathological findings.

Six(8%) of the removed kidneys in our series contained stones, which is comparable to the 6% in a large adult series of nephrectomies by Schiff and Glazier[20] and 11% in a pediatric series by Adamson et al and different from the 37% in Malik et al series[14]

Renal tuberculosis is an infection worth of mentioning in India as three cases (5.45%) 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[15] and 16.36% in report of Datta et al[16.] In Kubba, et al[19] and Malik et al[14] there were no tuberculosis cases. Beisland et al[10] found that five (2.4%) tuberculous kidneys were removed out of 209 nephrectomies carried out for benign conditions during 20 years at two Norwegian hospitals. Another report from Ghalayini et al[13] 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.

Of 23 renal tumors in this series four (17.3%) were benign as compared to a recent report on Saudi patients by Talik RF et al[21] where 14% of renal tumors were benign and Mahesh Kumar et al[39] where 16.6% cases were benign.This is in marked contrast with 5% of Malik et al,[14] 0% of Rafique M. et al,[15] 8% of Datta et al[16] and 6% of Fauzia Latif et al[18]

RCC is the most common primary malignant tumor of the kidney (85%) worldwide and constitutes 2-3% of all visceral malignancies in adults. The classification of renal cell neoplasms has been extensively studied in the last two decades and is based on a combination of histological, genetic and immunohistochemical features.

The incidence of renal cell carcinoma according to Datta et al[16] is about 69.6%, Fauzia Latif et al[18] is 87.2%, Rafique M. et al[15] is 100%, Eble et al[22] is about 90%, McLaughlin JK et al[23] is about 85% and in our study it is 73.68%.

Fuhrman's nuclear grading system was applied in our study. Nuclear grade II (5 cases 62.5%) was the most common presentation, while both grade I and higher grades (III and IV) were rare in our study. The results were similar to Fauzia Latif et al.[18] Which noted 63.3% cases in grade II, while both grade 1 and higher grades (III and IV) were rare.

Conclusion

This was a three and a half year study of 74 nephrectomy specimens in histopathology Department NHL Municipal medical college Ahmedabad from June 2009 to October 2012.

1. Maximum (22.97%) nephrectomies were done in age group 51-60 years.

2. The peak incidence of malignant lesions was in 6th decade (36.84%).
3. Among them, 46 were males and 28 were females with male, female ratio of 1.63:1 showing male preponderance.
4. Out of 74, 35 (47.29%) specimens were of left nephrectomy whereas 37 (50%) specimens were of right nephrectomy. In one case bilateral kidneys were removed for renal dysplasia. In another case horse shoe kidney was the indication for nephrectomy.
5. Out of 74 nephrectomies, 55 (74.33%) cases were of benign lesions while 19 (25.67%) cases were of malignant lesions.
6. Among the benign lesions, Chronic inflammatory causes (54.90%) was the leading cause for nephrectomy followed by renal calculus related hypofunctioning kidneys trauma and congenital diseases of kidney (11.76%) each cases.
7. Among the 4 cases of benign neoplasms 3 (75%) were of Angiomyolipoma and 1 (25%) case was of Cystic nephroma.
8. On the other hand Renal cell carcinoma (73.68%) was the most common etiology among the malignant lesions followed by Wilm's tumor (21.05%) and urothelial carcinoma(5.26%)
9. We found 6 cases of congenital kidney diseases, among which maximum cases were of multicystic renal dysplasia(50%), followed by bilateral renal dysplasia, horse shoe kidney and duplex kidney (16.66% each).
10. Conventional (clear cell) Renal cell carcinoma was the most common type of Renal cell carcinoma in our study accounting 57.14% cases, followed by Chromophobe type which were 14.29%, Papillary Renal cell carcinoma 14.29% and multilocular cystic Renal cell carcinoma which are 7.14% cases.
11. In 21.42% cases, the tumor occupied more or less the entire kidney. Also in 21.42% cases it occupied the upper pole, in 28.57% the lower pole, and in 28.57% the mid region.
12. Regarding Clear Cell RCC, the mean maximum diameter of the primary tumor was 6.6±4.9 cm. Capsular invasion was observed in 37.5% cases. Renal vein invasion was found in 25% cases, while renal sinus invasion was observed microscopically in 25% cases. Perinephric fat invasion was seen in 25% cases while Fascia of Gerota was involed in 12.25% cases. Adrenal gland involvement and lymph node metastases were not present in any case.
13. Fuhrman's nuclear grading system was applied. Among 8 cases of CCRCC, 12.25% showed grade I, 62.5% grade II, 2.25% grade III and 12.25% grade IV. It is evident that majority of CCRCC exhibited nuclear grade II.
14. Among PRCC, 50% exhibited low grade (1 and 2) nuclear features and one 50% showed high grade (grade 3).

Conflict of Interest: None.

References

1. Alpers CE. The Kidney. In: Kumar V, Abbas AK, Fausto N, Aster JC, editors. Robbins and Cotran pathologic basis of disease. 8th ed. Philadelphia: WB Saunders, 2010; pp 905-70.
2. Algaba F, Trias I, Scarpelli M, Boccon-Gibod L, Kirkali Z, Poppel HV.Handling and pathology reporting of renal tumor specimens. *Eur Urol* 2004;45:437-443.
3. Kirkali Z. The motion: open partial nephrec-tomy is the standard of care for small resec-table solid renal masses. *Eur Urol* 2007;51(2):561-564.
4. Sim HG, Yip SK, Ng NY, et al. Laparoscopic nephrectomy: new standard of care? *Asian J Surg* 2005;28(4):277-2781.
5. Rosai J. Guidelines for handling of most common and important surgical specimens. In: Rosai J, ed. Rosai and Ackerman's Surgical Pathology. 9th ed. St Louis: Mosby 2004; pp 2911-77
6. Greene FL, Page DL, Fleming ID, Fritz A, Balch CM, Haller DG, et al. AJCC cancer staging manual. 6th ed. New York: Springer-Verlag; 2002. p. 324.
7. Lopez-Beltran A, Scarpelli M, Montironi R, Kirkali Z. 2004 WHO classification of the renal tumors of the adults. *Eur Urol* 2006;49:798–805.
8. Fuhrman SA, Lasky LC, Limas C. Prognostic significance of morphologic parameters in renal cell carcinoma. *Am J Surg Pathol* 1982;6:655–663.
9. Eke N, Echem RC. Nephrectomy at the University of Port Harcourt Teaching Hospital; A ten year experience. *Afr J Med Sci* 2003;32:173-7.
10. Beisland C, Medby PC, Sander S, Beisland HO. Nephrectomy-indications, complications and post-operative mortality in 646 consecutive patients. *Eur Urol* 2000;37:58-64
11. Badmus TA, Salako AA, Sanusi AA, Arogunta A, Oseni GO, Yusuf BM. Adult nephrectomy: Our experience at Ile-lfe. *Niger J Clin Pract* 2008;11(2):121-6.
12. Phillips J, Catto JW, Lavin V, et al. The laparoscopic nephrectomy learning curve; a single centre's development of a de novo practice. *Postgrad Med J* 2005;81:599-603
13. Ghalayini IF. Pathological spectrum of neph-rectomies in a general hospital. *Asian J Surg* 2002;25:163-9.
14. Malik EF, Memon SR, Ibrahim AL, Gizawi AA, Ghali AM. Nephrectomy in adults: Asir Hospital experience. *Saudi J Kidney Dis Transplant* 1997;8(4):423-427.
15. Rafique M. Nephrectomy: Indications, complications and mortality in 154 consecutive patients. *J Pak Med Assoc* 2007;57(6):308-311
16. Datta B, Moitra T, Chaudhury DN, Halder B. Analysis of 88 nephrectomies in a rural tertiary care center of India. *Saudi J Kidney Dis Transpl* 2012;23:409-413
17. Mahesh Kumar U., Yelikar BR., Girija Patil, Mahesh H Karigoudar, Pankaj Pande and Patil SB.;Spectrum of Histopathological lesions in Nephrectomy specimens – A two year study in a tertiary care hospital; *Int J Res Pharm Biomed Sci* ISSN: 2229-3701
18. Fauzia Latif, Muhammed Mubarak, Javed Iqbal Kazi Histopathological characteristics of adult renal tumours: a preliminary report; (JPMA 61:224; 2011).
19. Kubba AK, Hollins GW, Deane RF. Nephrec-tomy: changing indications, 1960-1990. *Br J Urol* 1994;74:274-8.
20. Schiff M Jr, Glazier WB. Nephrectomy: indications and complications in 347 patients. *J Urol* 1997;118:930-l.
21. Talic RF, EL Faqih SR. Renal tumours in adult Saudi patients: a review of 43 cases. *Ann Saudi Med* 1996;16(5):517-20.
22. 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.

23. Mc Laughlin JK, Lipworth L:Epidemiologic aspects of renal cell cancer. *Semin Oncol* 27:115: 2000.
24. Kato M, Suzuki T, Suzuki Y, Terasawa Y, Sasano H, Arai Y. Natural history of small renal cell carcinoma: evaluation of growth rate, histological grade, cell proliferation and apoptosis. *J Urol* 2004;172:863-866.\

How to cite this article: Shah N, Goyal S, Histopathological study of nephrectomy specimens in a tertiary care hospital, *J Diagn Pathol Oncol* 2019;4(1):39-44