A histopathologic study of 50 nephrectomy specimens

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Abstract

Background: The study of Nephrectomy specimens makes an interesting subject. Not only many clinical suspicions are confirmed but also many unsuspecting lesions are brought to light by the Histopahological study.
Objective: To study the histopathology of 50 nephrectomy specimen
Methods: The present study included retrospective analysis of two years (January 2011 – December 2012) and prospective study of two years and three months (January 2013 – March 2014) of Nephrectomy specimens from the records of Department of Pathology, Dr. V. R. K. Women's Medical College, and Hyderabad. There were 50 nephrectomy specimens of which 39 were non-neoplastic and 11 were neoplastic.
Results: Lesions are more in number in males (31) than in females (19). Non-Neoplastic lesions are more common on Left side (58.98%). The neoplastic lesions are more common on Right side (63.64%). 4 cases of clear cell carcinoma were seen with large cells with abundant clear cytoplasm, centrally located vesicular nucleus with 1 (14.28%) showing nucleoli under low power (Fuhrmans nucleolar grade 3), 2(28.57) showing nucleoli under high power: (Fuhrman nucleolar grade 2) and one (14.28%) with bizarre nucleoli – (Grade 4).
Conclusion: Among the 50 nephrectomy specimens 39 (78%) revealed non-neoplastic lesions and 11 (22%) revealed neoplastic lesions. The lesions were more in males (31) than in females (19). Chronic pyelonephritis was the commonest lesion noted.

Key words: Nephrectomy specimens, Neoplastic lesions, Chronic pyelonephritis

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Introduction

The kidney lies in the posterior abdominal cavity. Kidneys serve to convert 1700 liters of blood that courses through them every day into highly specialized concentrated fluid of 1.5 – 2 liters called urine.[1]

Nephrectomy is the surgical removal the diseased kidney. Nephrectomy is compatible with life because the contralateral kidney takes up the function of the removed kidney and it undergoes compensatory hypertrophy to meet the increased workload.[2] Renal Cell Carcinoma in adults and wilms tumors in children are the commonest neoplastic, Chronic pyelonephritis the end stage of many infective and obstructive kidney lesions is the commonest Non Neoplastic indications for Nephrectomy.

The study of Nephrectomy specimens makes an interesting subject. Not only many clinical suspicions are confirmed but also many unsuspecting lesions are brought to light by the Histopahological study. Chronic pyelonephritis is the most common lesion. It frequently coexists with other non-neoplastic lesions like pyonephrosis, hydronephrosis and calculi. Chronic pyelonephritis can even be present along with neoplastic lesions. Among the tumors Renal cell carcinoma in adults and Wilms tumor in children are the commonest lesions.

The tumors of kidney are unique all cancers. In renal carcinoma many cases of spontaneous regression of primary tumor and regression of metastasis on excision of primary tumors are reported.[3] Resection of a lung metastasis may be followed by prolonged survival. Renal tumors are also unique in that they may harbor secondaries from a primary tumor in other organ (Cancer to cancer metastasis).[4] One common donor of such metastasis is lung carcinoma and the recipient is Renal cell carcinoma. The resulting microscopic picture may be baffling for the unwary. Renal cell carcinoma is a great masquerader in medicine as it can produce many clinical presentations unrelated to kidney.[5]

Methods

The present study included retrospective analysis of two years (January 2011 – December 2012) and prospective study of two years and three months (January 2013 – March 2014) of Nephrectomy specimens from the records of Department of Pathology, Dr. V. R. K. Women's Medical College, Hyderabad. There were 50 nephrectomy specimens of which 39 were non-neoplastic and 11 were neoplastic.

The clinical details and gross and microscopic features were noted from the records in retrospective study. In case of prospective study, the case details

were recorded as per appendix 1. On receiving the specimen of nephrectomy, gross features, like size and weight of the kidney, length of ureter, presence of capsule, external renal surface, tumor size and shape, location, colour of the tumore, cut surface of the tumor, tumor extension through the capsule, perinephric fat, calyses and pelvis, invasion of ureter and vessel, presence of normal kidney tissue and presence of lymph node metastases were noted in all the cases. Parallel slices were cut without mutilating the specimen and fixed in formalin overnight. Multiple sections for histology of 2-3 mm thick were taken from the following sites. (1) Tumor: three to four sections (including one with adjacent normal kidney) (2) Kidney not involved by tumor: two section (3) pelvis: one section. Renal artery and vein, Ureter, Lymphnodes were analysed if present. The tissue was routinely processed and embedded in paraffin sections were cut at 4-5 µ thickness and stained with Haematoxylin and Eosin stain.

Staining Procedures

Dewax sections in xylol, hydrate through graded alcohols to water. Stain in Enrlich's haematoxylin for 20-45 minutes. Differentiate (after a quick rinse in water) by dipping three or four times (about 3-10 seconds) in 1% acid alcohol (1ml conc HC1 to 99 ml of 80% ethyl alchol). Rinse in water. Blue by placing in tap water. Stain in 1 percent eosin 'Y' for 2 minutes. Wash in running tap water. Dehydrate through alcohols, clear in xylol, mount in DPX.

Results

The present study was conducted in the Department of Pathology, Dr. V. R. K. Women's Medical College. Hyderabad from January 2011 to March 2012. During this period the total number of histopathological specimens received was 12,410. The neoplastic specimens were 2413(19.44%) and Non Neoplastic 9997 (80.55%). Among the total 2413, neoplastic lesions 1926 (52.59%) were benign tumors and 1144 (47.40%) were malignant. In the present study, 50 nephrectomy specimens were received. Based on histological diagnosis the lesions were grouped into neoplastic and non-neoplastic. 11 Neoplastic (22% of all renal lesions) and 39 Non neoplastic (78% of all renal lesions) cases were documented and they are shown in Table 1.

Table 1: Year wise distribution of Nephrectomy Specimens (n = 50)

Year	Non Neoplastic	Neoplastic	Total
1998	01	-	01
1999	04	02	06
2000	17	05	22
2001	14	03	17
March, 2002	03	01	04
Total	39 (78%)	11 (22%)	50

Table 2: Side/Sex distribution of Nephrectomy

Neoplastic	Left Side	Right Side	Total
Males	04	05	09 (81.81%)
Females	-	02	02 (18.19%)
Total	04 (36.36%)	07 (63.64%)	11
Non Neoplastic			
Males	15	07	22(56.47%)
Females	08	09	17 (43.53%)
Total	23 (58.98%)	16 (41.02%)	39
Total			
Males	19	12	31
Females	08	11	19
total	27	23	50

Lesions are more in number in males (31) than in females (19). Non-Neoplastic lesions are more common on Left side (58.98%). The neoplastic lesions are more common on Right side (63.64%).

Table 3: Age/Sex wise distribution of lesions (n-50)

Age group	Non Neoplastic		Neoplastic		Total
	Male	Female	Male	Female	
0-10	05	03	02	-	10
11-20	02	00	-	01	03
21-30	04	04	-	-	08
31-40	04	04	01	-	08
41-50	04	03	03	00	10
51-60	03	02	02	00	07
>60 years	01	01	01	01	04
Total	22	17	09	02	50

Non-neoplastic lesions: The age of patients varied from 1½ to 69 years, the lesions predominantly occurred in age groups of 41-50. The lesions were more frequent in males 22(56.41%) than females 17 (43.59%).

Neoplastic lesions: The age of patients varied from 2½ years to 65 year. Majority of Neoplastic lesions occurred from 4-7th decade. Males more often affected than females.

Table 4: Incidence of clinical features in non-neoplastic lesions

Type of lesions	Pain abdomen	Mass abdomen	Haematuria	Fever	Dysuria Nocturia Polyuria	Pyuria bacteriuria	Calculus	Hypertension
CPN (17)	11(65%)	5(30%)	5(30%)	9(76%)	13 (76%)	7(41%)	7(40%)	8(47%)
Hydronephrosis (10)	7(70%)	8(80%)	4(40%)	3(30%)	-	-	2(20%)	7(70%)
Xanth-PN (3)	2(67%)	2(67%)	1(33%)	3(100%)	-	-	-	1(33%)
TB-PN (3)	1(34%)	-	1(34%)	1(34%)	2(64%)	1(34%)	-	1(34%)
RAS*(1)	-	-	-	-	-	-	-	1(100%)
Cystic Lesions(5)	5(100%)	5(100%)	1(20%)	1(20%)	-	-	-	3(60%)

Table 5: Incidence of clinical features in neoplastic lesions

Type of lesions	Pain abdomen	Mass abdomen	Haematuria	Fever	Dysuria Nocturia Polyuria	Pyuria bacteriuria	Calculus	Hypertension
RCC(7)	4(57%)	5(71%)	4(57%)	2(27%)	-	1(14%)	-	1(14%)
Wilms tx(2)	1(50%)	2(100%)	1(50%)	-	-	-	-	-
SCCof R. pelvis(2)	2(100%)	-	2(100%)	-	2(100%)	-	2(100%)	1(50%)

In chronic pyelonephritis majority had pyuria and Pain abdomen. In hydronephrosis mass abdomen was seen in 80%. Xantho granulomatous pyelonephritis presented with flank pain (67%). Tuberculous pyelonephritis presented with dysuria. Renal cell carcinoma presented with lump abdomen. In Wilms' tumor one case presented as mass abdomen with microscopic haematuria. Squamous cell carcinoma of renal pelvis cases had pain abdomen, haematuria and dysuria.

Table 6: Histological types of renal cell carcinoma

S. No	Types	Number of cases	Percentage
1.	Clear Cell	4	57.14
a)	Clear Cell with papillary pattern	1	14.28
b)	Clear cell with anaplastic areas in focal areas	1	14.28
2.	Chromophil type (eosinophilic)	1	14.28
3.	Chroomophobe type	1	14.28
4.	Renal cell carcinoma Sarcomotoid variant	1	14.28

4 cases of clear cell carcinoma were seen with large cells with abundant clear cytoplasm, centrally located vesicular nucleus with 1 (14.28%) showing nucleoli under low power (Fuhrmans nucleolar grade 3), 2(28.57) showing nucleoli under high power: (Fuhrman nucleolar grade 2) and one (14.28%) with bizarre nucleoli – (Grade 4).

Discussion

The number of nephrectomy specimens received during the period was 50. 11 cases (22%) were neoplastic and 39 (78%) were non neoplastic. All the neoplastic tumors were malignant. There were no benign tumors. 31 cases were seen in males and 19 cases in females giving a male: female ratio of 1.63:1.

Overall there were 27 (54%) nephrectomies on the left side and 23 (46%) nephrectomies of the right side. Between Non-neoplastic lesions 23 were left sided nephrectomies and 16 were right-sided nephrectomies giving a ratio of left to right 1.43:1. These nephrectomies are more common in the left side.

The Neoplastic lesions are more on the right side 7 out of 11 giving a ratio of 1.75 to 1. This is in accordance with many reported series where the right side malignancies were more common.[6]

Among the n on neoplastic lesions chronic pyelonephritis was the commonest 17 cases (34%). This is followed by Hydronephrosis 10 cases (20%). In a study of 95 nephrectomy specimens obtained from transplant recipients by Schwartz and Cotran 11 cases (11.57%) had chronic pyelonephritis.[7] in a series from New South Wales the study of 317 nephrectomies from transplant recipients for end stage renal disease 25 cases (8%) had chronic pyelonephritis.[8] the highest reported incidence of chronic pyelonephritis was seen in 30 cases (20%) in Kincaid Smiths study of 147 nephrectomies from transplant recipients.[9] A study of autopsy specimens at Boston City Hospital in 1965 & 1971 revealed the incidence of chronic pyelonephritis as 1.85%.[10]

In present study the majority 76% had pyuria and 65% had pain abdomen. Fairley F. Carson et al in 1971,[11] showed bacteriuria in 95-98% cases, burning micturation/frequency in 68%, suprapubic pain abdomen in 66%, fever in 44%, haematuria in 28% cases.[11] The clinical presentation in the present study is similar to the quoted reference.

All the chronic pyelonphritis cases had coarse corticomedullary scars with underlying dilated/deformed/blunted calyces. Hudson noticed radiologically in chronic pyelonephritis cases coarse scars with underlying dilated/blunted calcyces.[12] Hepatinstall has given the morphological criteria to call a case as chronic pyelonephritis. According to him, there must be coarse corticomedullary scars with under underlying dilated/blunted/deformed calyces.[13]

Hydronephrosis: 10 cases were recorded in the present study making a incidence of 20%. 6 cases were seen in males and 4 cases in females. But the published data gives females preponderance with a female to male ratio of 2:1.[14] The left side was more commonly involved in the present study 7/10 (70%). This is also in variance with published data that says hydronephrosis is more common on right side.[14]

The peak incidence 70% cases were seen in age group of 30-50 years in the present study. 2 cases of congenital hydronephrosis in girls both under five years were seen. The youngest case was a 2-year-old girl with congenital hydronephrosis and the oldest case was a 69-year-old women.

Xanthogranulomatous pyelonephritis was noted in 3 cases in the presnt study making 8% of non-neoplastic lesions and 6% of the total lesions. Xanthogranulomatous pyelonephritis is a rare condition Malek reported an incidence of 6 per 100 cases of surgically proven chronic pyelonephritis.[15]

In the present study 2 cases occurred in males aged 24 and 30 years and 1 case in a female-aged 60 years. Xanthogranulomatous pyelonephritis can occur at any age. The youngest reported case was in 11 months and the oldest was 89 years. It most commonly occurs in adults between 5th to 7th decade, with a female preponderance of 2:1.[16,15]

The most common symptoms observed in present study are flank pain (67%), mass abdomen (67%) and hypertension in one case (33%). Similar observations were made by Parson et al in a study of 8 cases, renal mass in (60%) renal pain in 80% and Hyertension in 40%.[16]

Tuberculous pyelonephritis wasa seen in 3 cases in the present study. There was 1 male and 2 females. Male preponderance is reported in genitourinary tuberculousis in ratio of 2:1.[17] Mostofi reported that most cases are in age group 20-40 years.[17] In the present study 2 cases in females belong to this age group. The youngest in the present study is a 6 year old boy who presented with non-functioning kidney with pelviureteric junction obstruction. Ustvedt in 1947 found that renal tuberculosis appear 3-10 years after primary infection.[18] He was of the opinion that it's unlikely that renal tuberculosis will be seen in a child before 10 years.

Cystic lesions, there were 5 cases (12.5%). Of these 3 were simple cyst 8% and 1 each of polycystic kidney disease and renal dysgenesis.

The frequency of simple cyst increase with age. Kissane and Smith 1975 found 50% of adults over 50 years had simple cysts on autopsy.[19] Laucks & Mclachlan (1981) demonstrated on Cumputerised Tomography 20% incidence of simple cyst by age 40 years and 33% after 60 years.[20]

In the present stusy grossly the kidney was of normal size distorted in shape and had 3 large cysts. Potter in 1972 described two types of dysplastic

kidneys.[21] Potter type A a multicystic kidney like bunch of grapes with little stroma between cysts, Potter type B is solid type with microscopic cysts and stromal predominance. It is also called solid cystic dyplasia.[21]

Microscopically the present case showed primitive tubules surrounded by thick bundles of fibrocollagenous tissue with few foci of cystic dilation of the tubules lined with low cuboidal epithelium. A few aggregates of lipomatous tissue was also present. Risdon and others defined two histologic criteria to diagnose dysplasia. 1) the presence of primitive tubules lined with cuboidal to columnar, sometimes ciliated epithelium, 2) these primitive tubules are surrounded by mantles of variably differentiated mesenchyme. Presence of metaplastic cartilage is variable but if present is diagnostic.[22]

22% of nephrectomy specimens received were neoplastic. All of them were malignant. These renal tumors constituted. 96% of all tumors (1144) reported during the study period. The incidence of renal cancers as reported by Benington 1933 is 1-3% of all malignancies.[23]

Of the 11 cases 7 were renal cell carcinomas (63.64%) 2 were Wilms' tumor (18.19%) and 2 were Squamous Cell Carcinomas of renal pelvis (18.19%). In a study conducted, George Linden in California from 1942 to 1949 found the incidence of renal cell carcinoma as (87.77%) of all renal tumors.[24] Lynch et al 1975 gives an incidence of 75% for renal cell carcinomas.[25] Present study revealed that renal cell carcinomas is more common in males with a male to female ratio as 2.5:1. Male preponderance is also reported by Kantor 1977 in 2: ratio.[26] Motzer RJ et al 1996 reported 2-3:1 ratio.[27]

2 cases constituting (18.18%) of all renal tumors were recorded in the present study. Both occurred in boy's aged 2½ and 9 years. Wilms' tumor is one of the most common solid tumors of childhood with 75% of cases dignosed between 1-5 years. 90% of cases occurring in children present before 7 years with a peak incidence between 2-4 years.[23]

Two cases were reported in the present study (18.18%) both were males aged 50 & 60 years.

Renal pelvis tumors constitute 7% of renal tumors. More than 90% of these are Transitional cell carcinomas only. 7 to 7% are squamous cell carcinoma of renal pelvis. Renal pelvis tumors occurs most often during 4-7th decade of life.[28]

Both cases in the present study presented with pain abdomen, haed dysuria. According to Lucien E. Nochomovitz et al most patients (70-80%) present with painless haematuria, flank colic (25%) and palpable mass in advanced cass.[29]

Conclusion

Among the 50 nephrectomy specimens 39 (78%) revealed non-neoplastic lesions and 11 (22%) revealed neoplastic lesions. The lesions were more in males (31) than in females (19). Non-neoplastic lesions were more common on the left side (58.98%). Chronic pyelonephritis was the commonest lesion noted (17 cases). Neoplastic lesion was more common on the right side (63.64%). Among the 11 neoplastic lesions, renal cell carcinoma was the commonest lesion

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