

A Histopathological Study of Non Neoplastic Lesions in Nephrectomy Specimens

Chandrashekar M.*, Shadakshari G.**, Bharath C.***

*Assistant Professor **Associate Professor ***Professor and Head, Department of Pathology, VIMS, Ballari, Karnataka.

Abstract

Introduction: Renal diseases are responsible for a great deal of morbidity and mortality. Millions of people are affected annually by fatal and non fatal kidney diseases. Many of the diseases result in end stage renal disease showing typical gross and microscopic features. Thus the present study was undertaken to explore, elucidate and document the kidney lesions at nephrectomy. *Methodology:* The study was retrospective as well as prospective and included 80 nephrectomy specimens over a period of 3 yrs. The gross morphology and the microscopic sections were studied. *Results:* In the present study, a total of 80 cases of nephrectomy specimens were studied. Of these 80 cases, 45 were non-neoplastic lesions (56.25%). *Conclusion:* Chronic pyelonephritis was most commonly found.

Keywords: Nephrectomy; Chronic Pyelonephritis; Renal Cell Carcinoma.

Introduction

Historically, Isak Denison defined kidney as. An ingenious machine designed to turn with infinite artfulness, the red wine of Shiraz into urine. Human kidneys serve to convert more than 1700 liters of blood per day into more than one liter of urine. Renal diseases are responsible for a great deal of morbidity, rather than mortality and necessitate renal dialysis and renal transplant [1]. The most common lesions encountered in kidneys today are certain inflammatory and neoplastic lesions.

Nephrectomy brings in relief to patient from various chronic and life threatening disease and in some cases make way for renal transplant. Renal cell carcinoma comprise for 3% of all cancer deaths. Staging and grading remain the most useful indicators for prognosis in renal neoplasia amidst the increasingly sophisticated techniques such as cytophotometry and molecular biological assessment [2].

The introduction of nephrectomy and other subsequent surgical interventions for renal diseases

provided the clinical information and the histopathologic insight that form the basis of our current concept on renal Tumours [3]. Harries in the year 1882 reported on 100 surgical extirpations of the kidney, sufficient number to permit some sort of analysis of clinical, surgical and pathological features of renal disorders that require surgery [4].

Hence, the present study was undertaken to become familiar with the morphological features and to explore, elucidate and document the kidney lesion at nephrectomy

Methodology

The present study was done on the nephrectomy specimens sent for histopathological evaluation to the Department of pathology, Medical College and Hospital during a period of 3 years. This is 1 year retrospective and 2 years prospective study.

In the retrospective analysis of cases, the description of the gross findings were taken from the records maintained in the department. Following the receipt of nephrectomy specimen in 10% formalin, a detailed gross examination of the specimen was recorded. The required number of representative sections was taken for histopathological study. After

Corresponding Author: Chandrashekar M., Assistant Professor, Department of Pathology, Vijayanagara Institute of Medical Sciences (VIMS), Ballari, Karnataka-583104
E-mail: ramspms@gmail.com

routine paraffin processing, serial sections of 5-micron thickness were cut and routinely stained with haematoxylin and eosin stain. Detailed microscopic features were studied and recorded. Special stains were used as and when required. The final diagnosis was arrived at after correlating the clinical features, gross and microscopic findings.

Required relevant clinical and imaging details were obtained from patient case sheets or records wherever required. In the present study 80 nephrectomy

specimens morphology was analysed as per the proforma protocol.

Results

The present study was carried out on a total of 80 nephrectomy specimens. Out of which 45 cases (56.25%) were non-neoplastic.

Table 1: Distribution of various lesions in the present study

Sl.No	Non-neoplastic Lesions	No. of cases	% of cases
1.	Chronic pyelonephritis	32	40
2.	Hydronephrosis	7	8.75
3.	Tuberculous pyelonephritis	3	3.75
4.	Hydatid cyst	1	1.25
5.	Traumatic injury	1	1.25
6.	Polycystic kidney	1	1.25

Table 2: Clinical presentation of non-neoplastic and neoplastic lesions of the kidney

Clinical Symptoms	Non-neoplastic lesions
Pain abdomen	19
Mass per abdomen	04
Hematuria	00
Fever	18
Burning micturation	25
Difficulty in passing urine	08
Loss of appetite	00
Incidental finding	01

Table 3: Age distribution of the non-neoplastic lesions

Non-neoplastic lesions	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	Total
CPN	1	6	5	5	3	4	8	-	32
HN	-	1	1	2	1	-	1	1	7
TB	-	-	3	-	-	-	-	-	3
Hydatid cyst	-	-	-	-	1	-	-	-	1
Traumatic injury	-	-	1	-	-	-	-	-	1
ADPKD	-	-	-	-	1	-	-	-	1
Total	1	7	10	7	6	4	9	1	45

Among non-neoplastic lesions burning micturation (25 cases-55.55%) was the commonest presenting symptom

Majority of the non-neoplastic lesions were seen between age 21-30 years which comprised of 10 cases (12.5%)

Chronic pyelonephritis was the commonest non-neoplastic lesion in females. However in the present study there was male predominance. No significant difference was noted in the frequency of males and females in case of the other non-neoplastic lesions of kidney.

Table 4: Gross features of non neoplastic kidney lesions:

Gross findings	CPN	HN with CPN	External surface		Hydatid cyst	Traumatic injury	ADPKD	No of cases
			HN	TB				
Normal size	2	3	2	-	-	-	-	7
Enlarged kidney	7	7	3	2	1	1	1	22
Shrunken kidney	8	5	2	1	-	-	-	16
Normal shape	14	13	6	3	1	1	1	39
Distorted	3	2	1	-	-	-	-	6
Adherent renal capsul	11	4	3	2	1	-	-	21
Smooth	3	7	6	1	-	-	1	18
Rough	13	9	1	2	-	1	-	26
Scarred	12	11	-	-	-	-	-	23
Cut section								
PCD	5	14	6	1	-	-	-	26
Loss of CMD	8	8	-	2	-	-	1	19
Thinned out cortex	6	15	6	2	-	-	1	30
Yellow nodular areas	5	-	-	-	-	-	-	5
Calculi	4	13	6	-	-	-	-	23
Caseous necrosis	-	-	-	2	-	-	-	2
Necrosis	4	-	1	-	-	-	-	5

Gross Morphology

External Surface

In the present study out of 45 cases of non neoplastic lesions enlargement of kidney was seen in 22 cases, while 7 were normal in size and 16 were contracted. 39 showed normal shape and rest of the 6 cases were distorted. 21 cases showed thickened and adherent capsule. As many as 26 nephrectomy specimen showed rough external surface followed by smooth surface in 18 cases. Scarring was noted in 23 cases

Cut Surface

Majority of the cases showed dilatation and distortion of pelvi-calyceal system (26 cases) followed by thinning of cortex in (30 cases), localized yellow nodular areas (5 cases), caseous necrosis (2 cases). In the present study stones were present in 23 nephrectomy specimens; they were single to multiple stones measuring between 3x2x2cms to 2x2x1cms, black in color. Most of the calculi were seen in cases of hydronephrosis with chronic pyelonephritis.

There were three cases of tuberculous kidney out of which one was shrunken. The cut surface showed dilatation of pelvic calyceal system with minimal thinning of cortex and areas of caseous necrosis. Microscopically caseating epithelioid granulomas were noted.

A single case of renal hydatosis was noted in the present study; grossly it showed a unilocular, pearly white cyst m/s 6x4cms in the lower pole of the right kidney containing multiple daughter cysts. This was microscopically confirmed by the presence of an eosinophilic laminated membrane and scolices.

One case of traumatic renal laceration was noted as a result of fall from tree, grossly outer surface was congested with a laceration at hilum m/s 5x4 cms. Microscopic picture showed coagulative necrosis with areas of hemorrhage.

There was a case of incidentally detected polycystic kidney in the present study at age of 50 years in a male patient; grossly kidney was enlarged with a bosselated outer surface produced by multiple cysts. Microscopy showed multiple cysts lined by flattened cuboidal epithelium.

Table 5: Microscopic features of chronic pyelonephritis and hydronephrosis

Microscopic findings	CPN	HN with CPN	HN
Thinned out cortex and medulla	3	15	6
Glomeruli:			
Sclerosis of glomeruli	6	4	1

Periglomerular fibrosis	12	4	2
Tubules:			
Focal atrophy of tubules	11	7	5
Focal dilatation of tubules	5	6	6
Tubular colloid casts	12	8	2
Interstitial:			
Mononuclear infiltrate	16	14	2
Neutrophilic infiltrate	4	1	-
Lymphoid aggregates	5	1	-
Foamy macrophages, giant-cells	5	2	-
Fibrosis	6	13	3
Bloodvessels:			
Hyaline arteriosclerosis	8	4	-
Thickened	-	-	3



Fig. 1: Chronic pyelonephritis; showing irregular, granular surface with depressed scars

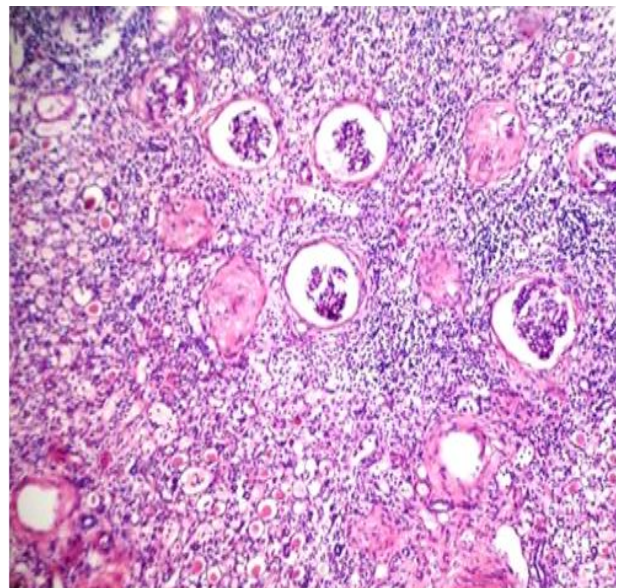


Fig. 2: Showing dense lymphocytic infiltrate, periglomerular fibrosis, glomerulosclerosis and colloid casts (10x: H-E)



Fig. 3: Hydronephrosis; C/s showing dilated pelvicalyceal system with thinned out renal cortex

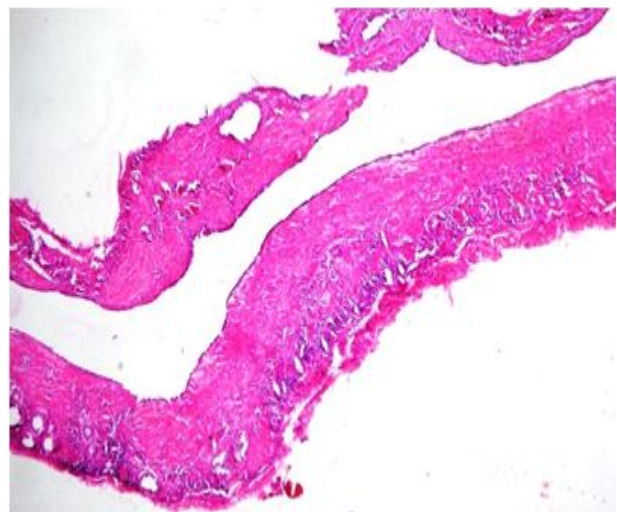


Fig. 4: Showing cyst wall lined by flattened cuboidal cells with lymphocytic infiltrate and compressed renal tissue (scanner: H-E)



Fig. 5: Polycystic kidney showing enlarged bosselated kidney with multiple cysts

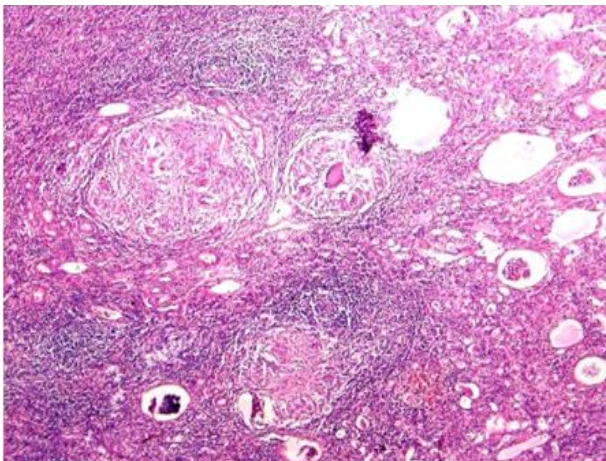


Fig. 6: Renal tuberculosis showing renal tissue with epithelioid granulomas, Langhans type of giant cells and lymphocytic infiltrate (10x: H-E)

Out of 32 cases of chronic pyelonephritis, hydronephrotic changes were noted in 15 cases and xanthogranulomatous change in 5 cases.

Discussion

Many non-neoplastic and neoplastic lesions constitute an indication for nephrectomy in urology today. The present study was an analysis of 80 nephrectomy specimens, which included 45 non-neoplastic (56.25%).

In the present study, 45 non-neoplastic lesions were encountered among them CPN consisting of 40%, hydronephrosis in 8.75%, tuberculous pyelonephritis

in 3.75%, single case of hydatid cyst, polycystic kidney and traumatic injury. Majority cases of CPN with or without hydronephrosis were observed between 2nd and 7th decades.

Chronic Pyelonephritis

Non obstructive pyelonephritis is said to be less common than obstructive pyelonephritis. Many causes of urinary obstruction are known, the commonest being renal calculi. In the present study, obstructive chronic pyelonephritis (53.1%) was found to be much more common as compared to non-obstructive chronic pyelonephritis (46.9%), with only four cases showing renal calculi. The reason for this could be that nowadays most cases of renal calculi are being treated conservatively and hence nephrectomy is not required in most of these cases.

Pyelonephritis is seen in all age group with peak incidence in infancy and childhood, women of child bearing age and both men and women older than 60 years [5,6]. In the present study majority of chronic pyelonephritis were seen between 3rd and 6th decade. The gross and microscopic findings of the present study were similar to the description available in the literature. Out of 32 cases of CPN, 71.87% of the cases showed depressed scars on the surface with clubbing of calyces which was also observed by Smith et al., in 14 cases (71.47%) [7]. In contrast to available literature chronic pyelonephritis were observed more commonly in males than females in the present study.

Xanthogranulomatous Pyelonephritis (XGP)

XGP is an uncommon inflammatory disorder. In the present study, XGP accounted for 11.11% of non-neoplastic lesions of the kidney and 6.25% of all renal lesions. It was commonest with 2 cases in the age group 61 to 70 years. XGP has a female predominance [8], as was observed in the present study also with Female to male ratio of 1.5:1. Hammeden et al reported 11 cases of XGP in childhood and they mainly presented with urinary tract infection, flank pain, palpable renal mass, and fever. Grossly he observed the renal parenchyma replaced by yellow fatty tissue which was also noted in the five cases of the present study, the clinical features were also similar to their study [9]. The features of XGP were similar to the typical case of XGP described in the literature. Calculi have been found in a large number of patients with Xanthogranulomatous pyelonephritis [7] however no calculi was seen in the present study. The diagnosis of XGP can be sometimes confused with renal cell carcinoma because of histiocytes, misdiagnosing it as

RCC clear cell type. Distinguishing Malakoplakia requires determining the absence of diagnostic inclusion of Michalis Gutmann bodies [6].

Hydronephrosis

Hydronephrosis is a frequent cause of renal failure. It usually occurs as a result of urinary tract obstruction. There is a peak incidence below the age of 1 year and then again in the elderly [7]. In the present study, 7 cases of hydronephrosis and 15 cases of hydronephrosis with chronic pyelonephritis were encountered. One case of hydronephrosis with chronic pyelonephritis and no case of hydronephrosis was encountered in children. Majority of the HN with CPN cases occurred between 2nd. 7th decades of age and HN occurred between 31-40 years. In adults aged 20 to 60 years, various causes of obstruction leading to hydronephrosis have been described.

These include causes like calculi, Tumours, foreign bodies etc. In the present study, hydronephrotic changes was mainly due to calculi (19 cases). All cases of hydronephrosis showed renal parenchymal thinning and atrophy in the present study, similar findings were observed by Schrader et al.

Tuberculosis

Renal tuberculosis was diagnosed in three cases (3.75%) of present study. Simon et al (1977) reported a male preponderance of renal tuberculosis, with the highest incidence between the ages of 20-50 years [10]. In the present study, all cases occurred between age group 21-30 with male to female ratio 2:1 and microscopically all cases showed multiple caseating epithelioid granulomas with langhan.s giant cells. However Z-N stain was negative.

Hydatid Cyst

Renal hydatosis accounts for 1-2% of the cases. In the present study only one case was noted accounting to 1.25% occurring in a 50 year old female. Grossly showed a unilocular cyst m/s 6x4 cms and microscopically showed laminated membrane and scolices. The size of the cyst and microscopic features were similar as observed by Das et al [11]. In the present study, ADPKD was observed in male patient aged 50yrs and showed enlarged, bosselated kidney with multiple cysts, microscopy showed multiple cysts lined by flattened cubodial cells. These findings were similar to the studies done by Berstein and Evan [12]. Traumatic injury accounting to 1.25% in the present study was noted.

Conclusion

Chronic pyelonephritis was the commonest non-neoplastic lesion in females. However in the present study there was male predominance. No significant difference was noted in the frequency of males and females in case of the other non-neoplastic lesions of kidney.

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