



RETROSPECTIVE ANALYSIS OF NEPHRECTOMY PERFORMED IN AN INSTITUTION FOR LOWER SOCIOECONOMIC POPULATION IN INDIA

General Surgery

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ABSTRACT

Background- Nephrectomy is a therapeutic procedure done for various indications like malignancy of kidneys and upper urinary tract, trauma, infections, transplant and for poor/non functioning kidney due to different causes.

Aim- To study demographic profile, indications & its pathological correlation in patients who underwent nephrectomy in our institution.

Material and method- This retrospective study from January 2011 to May 2017 was conducted in department of surgery and department of pathology. The total renal surgeries performed in the institution during the period were analyzed and number of nephrectomies performed were evaluated.

Results- The study population consisted of 321 patients who underwent surgery for different upper urinary tract pathology. Out of the total 321 renal surgeries 107 were nephrectomy. The benign causes for nephrectomy were 71.1% as compared to the malignant cause which were 28.9%.

Conclusion- We can conclude that despite newer diagnostic methods, benign conditions continue to be leading cause of nephrectomy in developing nations. It can be largely attributed to late presentation to hospital in patients with renal stones and complications in these patients ultimately lead to loss of function and nephrectomy.

KEYWORDS

Nephrectomy, Renal Stones, Renal Malignancy

Introduction

The kidneys serve a number of important functions required to maintain normal physiological function in human body like maintaining fluid, electrolytes, blood pressure and red blood cell production through various mechanisms. However they can be involved in various pathological processes, and some of which may ultimately culminate in its surgical removal (Nephrectomy).

Nephrectomy is a therapeutic procedure done for various indications like malignancy of kidneys and upper urinary tract, trauma, infections, transplant and for poor/non functioning kidney due to different causes. The causes of loss of renal function or kidney becoming non functioning (NFK), leading to nephrectomy are different in paediatric and adult patient population. Vesicoureteric reflux is the leading cause of nephrectomy in children.¹ Some reports list malignancy as the leading cause in adults², while others report the sequelae of obstruction, collectively known as obstructive nephropathy leading to NFK, as the main indication.^{3,4}

Aim

To study demographic profile, indications & its pathological correlation in patients who underwent nephrectomy in our institution.

Materials and Methods

This retrospective study from January 2011 to May 2017 was conducted in the department of surgery and department of pathology in ESI PGIMSR & Hospital, New Delhi. The total renal surgeries performed in the institution during the period were analyzed and number of nephrectomies performed evaluated with reference to demographic profile, indications and pathological data of the patients were recorded and assessed.

According to our institutional protocol, elective nephrectomy is done in malignant diseases of the kidney, nonfunctioning kidney diagnosed on intravenous urogram (IVU) or isotope renal scan, uncontrolled hematuria after operation for kidney stone, pyonephrosis, tumours and undiagnosed large renal mass. Renal trauma is the leading cause of nephrectomy in emergency setting; life threatening urosepsis and post surgery haemorrhage are the other causes.

A non-functioning kidney was defined as one having paper-thin parenchyma on urinary ultrasound or computed tomography, exhibiting no contrast visualization in the collecting duct system on intravenous urography and having a split renal function of <10% on nuclear renal function studies (DTPA, DMSA).

Descriptive statistics was analyzed with SPSS version 17.0 software. Categorical variables are expressed as frequencies and percentages. The Pearson's chi-square test or the chi-square test of association was used to determine if there is a relationship between two categorical variables. $P < 0.05$ was considered statistically significant.

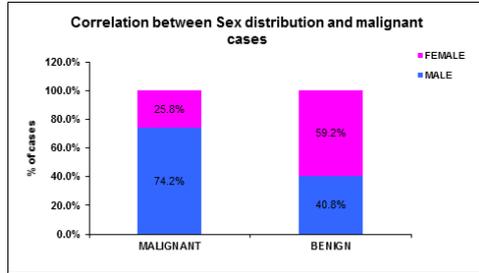
Results

321 patients underwent surgery for different upper urinary tract pathology out of which 107 were nephrectomies (33.33%). The percentage of nephrectomy out of renal surgeries performed per year was highest in 2016 (41.81%) followed by 2014 (40.74%) and lowest in 2015 (23.21%).

There was slight predominance of female gender (165 vs 156) in overall number of renal surgeries performed. Whereas, the number of nephrectomies in both gender were almost identical (53 vs 54). The malignancy in male patients was high as compared to females (23 in males compared to 8 in females). (Table 1, Graph 1) P value was significant.

Table 1- Gender-wise distribution of nephrectomy cases

	RENAL SURGERIES (n=321)	NEPHRECTOMY (n=107)		TOTAL	P value
		MALIGNANT	BENIGN		
MALE	156	23	31	54	0.002*
FEMALE	165	8	45	53	

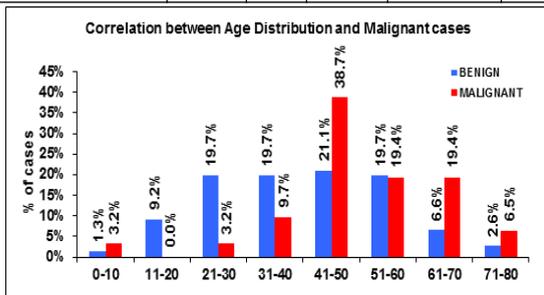


Graph 1- Gender-wise distribution of nephrectomy cases

In this study the benign causes for nephrectomy were 71.1% as compared to the malignant cause which were 28.9%. The nephrectomies for both benign and malignant cases were more for the right side kidney (59) as compared to left side (48). (Table 2) P value was insignificant.

Table 2- Distribution of benign and malignant cases with side involved

NUMBER OF NEPHRECTOMY CASES	RIGHT	LEFT	TOTAL	Percentage	P value
BENIGN CASES	40	36	76	71.1%	0.414
MALIGNANT CASES	19	12	31	28.9%	
TOTAL	59	48	107		



Graph 2- Correlation between Age Distribution and Malignant cases

Most number of cases both benign and malignant were mostly seen in the age group of 41 years to 50 years (28), followed by 51 to 60 years age group (21). (Table 3, Graph 2) The number of patients in 41-60 age group were 49 (45.79 %) of total nephrectomies performed and the malignancy was also highest in this age group i.e. 18 (58%). P value was significant.

Table 3- Age wise distribution of benign and malignant cases

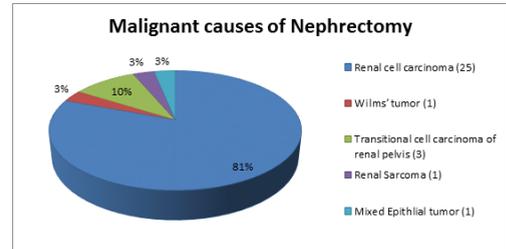
AGE	BENIGN	MALIGNANT	TOTAL NEPHRECTOMY	P value
0-10	1	1	2	0.029*
11-20	7	-	7	
21-30	15	1	16	
31-40	15	3	18	
41-50	16	12	28	
51-60	15	6	21	
61-70	5	6	11	
71-80	2	2	4	
Total	76	31	107	

The chief presenting complaint in our study was flank pain followed by hematuria, fever, and burning micturition. (Table 4) These are the commonly presenting features of renal stones with or without complications.

Table 4- Presenting complaints of patients in our study

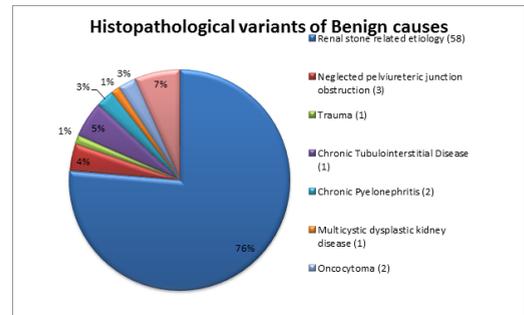
Presenting complaints	No. of cases
Flank pain	80
Hematuria	45
Fever	40
Lump abdomen	25
Burning micturition	30
Vomiting	20

In malignancies the most commonly seen malignancy was renal cell carcinoma (RCC) with clear cell carcinoma as most predominant type (19 out of 25). Other than RCC there was transition cell carcinoma (3) and few cases of some rare malignancies like sarcoma, mixed epithelial tumor. (Pie Chart 1)



Pie Chart 1- Histopathological variants of malignant causes

The most common benign condition/cause for nephrectomy was renal stone (58) with different complications like NFK ± hydronephrosis (43), pyonephrosis(10), pyelonephritis(5). Followed by other benign causes like trauma, NFK due to medical conditions and some congenital developmental anomalies leading to nephrectomy. (Pie Chart 2)



Pie Chart 2- Histopathological variants of Benign causes

Discussion

Despite being a vital organ in body, kidney can be removed safely provided the second kidney is healthy. First successful nephrectomy was done by German surgeon Gustav Simon in 1869. Since then various approaches to kidney (transabdominal, loin) and techniques (open, laproscopic) and types (simple, radical, partial) have been practiced. Nephrectomy can be performed not only by a urologist but also by the general, paediatric, trauma and vascular surgeons.^{5,6}

In a report of 423 consecutive nephrectomies performed in a general hospital of Sudan,⁷ 70% cases were performed for benign conditions. In a report of 85 adult nephrectomies performed at al Bashir Hospital, Saudi Arabia,⁸ 77.6% cases of nephrectomy were done for benign conditions. Similarly, in a series of 135 nephrectomies reported from Pakistan,⁹ 76.6% cases were due to benign causes. Datta et al¹⁰ published analysis of 88 nephrectomy in a rural tertiary centre of India that showed 62.5% of nephrectomy was for benign conditions. Our study is in concordance with these studies. The total renal surgeries performed during the study period were 321 and nephrectomies performed were 107 (33.33%). The benign causes for nephrectomy were 71.1% as compared to the malignant cause which were 28.9%. Apart from Nigeria,^{11,12} in most of the reported series^{7,8} from developing countries, benign diseases of the kidney were the leading causes of nephrectomy. The incidence of nephrectomies for benign conditions such as chronic pyelonephritis is decreasing and nephrectomies for malignant lesions are increasing in the developed countries^{4,13}. The reason for this change in trend being early detection and better treatment modalities that prevent the need for surgeries are available for inflammatory lesions of the kidney in the developed countries compared with developing nations.

Loin pain was the leading presenting symptom in our study, as it was in almost all the previous reports.¹⁴⁻¹⁶ In our study benign conditions and out of them renal stone was most common condition. Renal colic was the most common presentation of patients with other associated symptoms like haematuria, UTI were commonly observed.

In the benign conditions the most common cause was nephrolithiasis (54.20%) related complications e.g NFK, pyonephrosis, pyelonephritis due to UTI and medical disorders leading to NFK were other causes along with 2 cases of a rare tumour oncocyoma.

The increase in nephrolithiasis is partially attributed to its strong association with features of the metabolic syndrome such as obesity, hypertension, and diabetes, which have also been steadily increasing.¹⁷

Renal cell carcinoma accounts for approximately 2 percent of adult malignancies and 80-85 percent of malignant kidney tumors.¹⁸ Renal cell carcinoma occurs twice as commonly in men than in women, it is primarily a disease of elderly patients, typically presenting in the fifth to seventh decades of life; however, it has been reported in much younger patients as well.¹⁹

In the present study, a total of 31 (28.9%) malignant lesions were observed of 107 nephrectomy specimens; of these, a vast majority comprised renal cell carcinomas, i.e., 25 cases (80%). microscopically, the clear cell type of renal cell carcinomas was the predominant type of tumor observed, involving 19 (76%) cases. Aiman et al²⁰ in their study, observed a total of 32 (22.8%) malignant lesions; of these, a vast majority comprised renal cell carcinomas, i.e., 25 cases (53.1%) with 20 (80%) of them were clear cell type. Mohammad Rafique⁹ who observed that the majority of malignant neoplasms (97%) of the kidney were renal cell carcinomas. Our findings are similar to the studies by Aiman and Rafique. Popat *et al.*²¹ in their study, found that 70% of malignant lesions were accounted for by renal cell carcinomas. Among renal cell carcinomas, a majority of cases (72%) were seen in males and 28% in females. In our study the malignancy in males was higher than in females which correspond to the study by woldrich et al²² and popat et al.

Conclusion

We can conclude that despite newer diagnostic methods, benign conditions continue to be leading cause of nephrectomy in developing nations. It can be largely attributed to late presentation to hospital in patients with renal stones and complications in these patients ultimately lead to loss of function and nephrectomy. To prevent these complications, people should be made aware of renal stone related complications and treatment available at the grass root level.

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