Original Research Article

Evaluation of the reasons of nephrectomy in pediatric population

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Abstract

Background: Evaluation of the reasons of nephrectomy specimens in pediatric age group who presented with severe renal failure or mass lesion, which may be useful in the management of pediatric end stage renal disease. We aimed to evaluate the reasons for nephrectomy in pediatric population and to determine the frequency of various lesions.

Materials and methods: It was a retrospective study of nephrectomy specimens received in our department during the period of June 2006 to June 2011 (5 years). Reasons of nephrectomy, age and sex of the patients were assessed.

Results: Total 36 nephrectomy specimens were analyzed. These included 25 male children, and 11 female child. Age was ranging from 15 days to 16 years. The kidney size was small in most of the patients. The following causes were evaluated by HPE of specimens: Infantile polycystic kidney – 3, Mesoblastic nephroma – 1, Wilm's tumor – 2, Cystic renal dysplasia – 1, Blunt injury – 4, PUJO with hydronephrosis – 15, Hydronephrosis and chronic pyelonephritis – 10.

Conclusion: Nephrectomy in pediatric age group is an ultimate indication which is generally realized in neoplastic involvement of the kidney. Providing histopathological features of nephrectomy specimens and reasons, which could be useful to reduce the incidence of non tumoural nephrectomy in the pediatric population. There is need to emphasize the importance of early diagnosis of renal lesion in pediatric age group to prevent nephrectomy.

Key words

Nephrectomy, Pediatric, Renal lesions.

Introduction

Pediatric renal lesions present special challenge to the surgical pathologists because of their histological diversity. Evaluation of the reasons of nephrectomy in children with severe renal dysfunction may be useful in the management of pediatric end stage renal disease. Though radiological examination is a useful first step in the work up [1], histological examination is indispensable for diagnosis and prognostication .Indications for nephrectomy differ between the pediatric and adult patient population [2]. While vesico ureteric reflux is the leading indication for nephrectomy in children, malignancy is the leading cause in adults. Kidney can be involved in various pathological processes, some of which may require its surgical removal. The decision for performing nephrectomy is mainly based on the results of renal ultrasonography and radionuclide scans [3, 4].

Deterioration of the renal function may occur in some congenital or acquired disorders in which nephrectomy becomes necessity. Simple nephrectomy is a standard therapeutic urological procedure in patients with an irreversibly damaged kidney due to chronic infection, obstruction, calculus disease, pyelonephritis, reflux or congenital dysplasia, severe trauma, renal vascular hypertension, congenital dysplasia and renal neoplasms. Fortunately the annual incidence of end stage renal disease (ESRD) in children is very low. In some infection-related diseases, nephrectomy can be avoided if the diagnosis is made early and adequate treatment is instituted, although when there is severe deterioration of renal function as seen in some congenital and acquired disorders, nephrectomy becomes necessary [5].The recognition, of late, that the pediatric kidney has a remarkable ability to recover its function after reconstructive surgery has led to a more conservative approach thereby reducing the incidence of nephrectomy in children [6]. Although radical nephrectomy is the standard treatment for localized renal carcinoma with a normal contra-lateral kidney, there is a growing interest in the use of nephron sparing surgery for selected patients [7].

We aimed to document and categorize the reasons of pediatric nephrectomies and we tried to determine the percentage of some diseases in which nephrectomy can be prevented. The goal should be to document and categorize those cases that will impact the health of the infants and children with timely referral to pediatric surgeon and possible intervention to minimize adverse outcomes.

Aim and objectives

Aim and objectives of present study was evaluation and analysis of nephrectomy specimens to identify the causes of non-functioning kidney in pediatric age group and to analyze patterns of various renal lesions in pediatric group.

Materials and methods

The study was conducted in the Department of Pathology, Gandhi Hospital/ Gandhi Medical College, Secunderabad form 2006 to 2011. The medical records of the patients who underwent nephrectomy were reviewed.

Data extracted included age, clinical presentation. Retrospective study of 36 nephrectomy specimens received in Department of Pathology, Gandhi Hospital, Secunderabad for 5 years was done.

The patients include 69.4% males and 30.6% females. Their ages ranged from 15 days to 16 years. The study patients underwent simple nephrectomy. The specimens were formalin fixed, paraffin embedded and stained with H and E. The analysis included operative findings, gross and histopathological features. The findings were compiled to arrive at definitive diagnosis (**Figure – 1, 2**).

All patients underwent urine analysis and blood bio-chemistry investigations and renal ultra

sound scan to evaluate the functions of the kidneys that were labeled for nephrectomy.

Figure – 1: H&E stained section showing interlacing bundles of spindle shaped cells with adjacent normal kidney – features of mesoblastic nephroma.

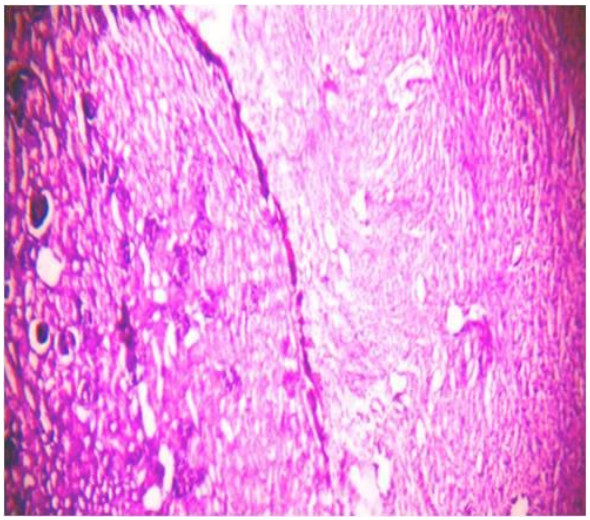
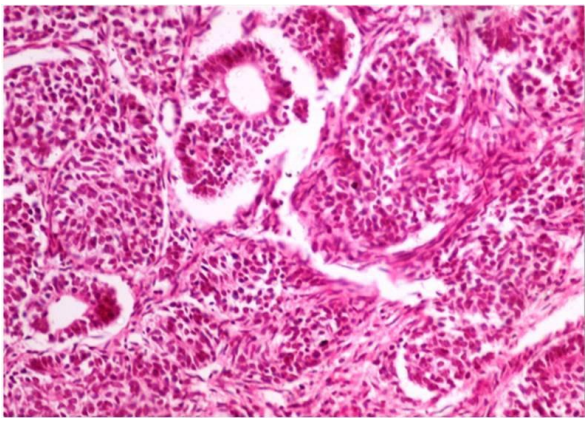


Figure - 2: H&E Stained section showing features of wilms tumour with blastemal and stromal components.

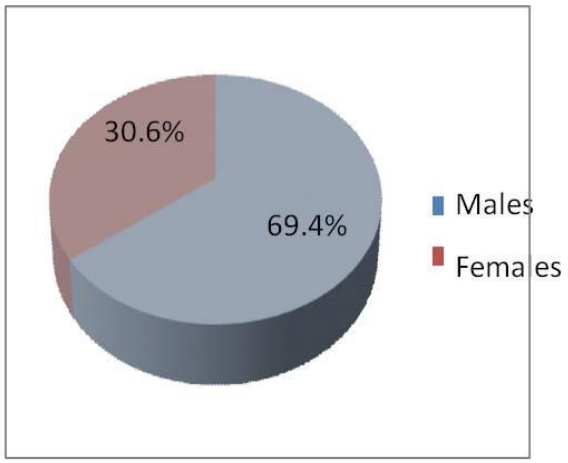


The presence of urinary infection at operation time was searched by both direct microscopic examination and recorded urine culture results for each case. Radiological investigations were consisted of intravenous pyelography, retrograde pyelography, ultrasound scan and computerized tomography (CT), while scintigraphic studies were of conventional renal scans with Tecnetium 99m diethylene triamine pentaasetic acid (DTPA) and Tecnetium 99m di mercapto succinic acid (DMSA).

Results

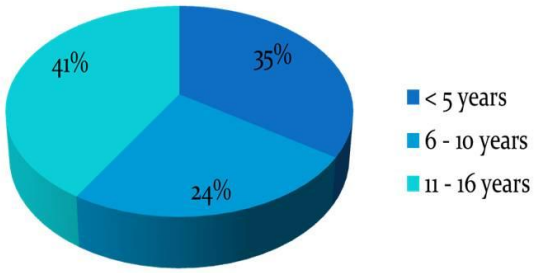
During the 5 years study period, 36 nephrectomies were performed. 25 patients were males (69.4%) and 11 were females (30.6%) as per **Graph - 1**.

Graph – 1: Sex distributin of cases.



Age of the patients ranged from 3 months to 16 years. The children less than 5 yrs were 35%, from 6-10 years were accounting up to 24% and between 11-16 years formed remaining 41% of cases. Majority of them belong to older and adolescent group as per **Graph - 2**.

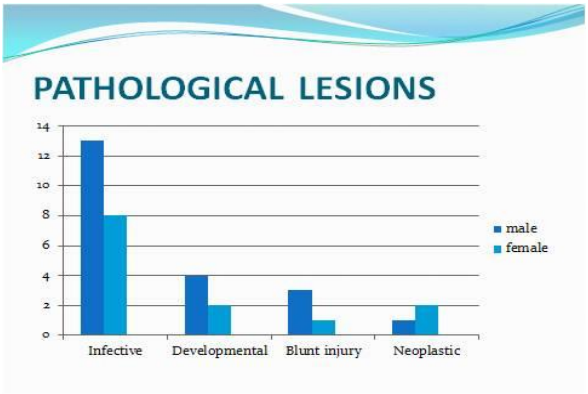
Graph – 2: Age distribution of cases.



Patients with benign and malignant conditions presented with various clinical patterns. Majority of patients presented with signs and symptoms of chronic pyelonephritis like fever, polyuria, bacteruria and other presenting features included anemia, hypertension, mass abdomen, generalized edema and oliguria. The various pathological lesions encountered in our study were divided into infective, developmental, blunt

injury and neoplastic diseases involving kidney as per **Graph - 3**.

Graph – 3: Pathological lesions.

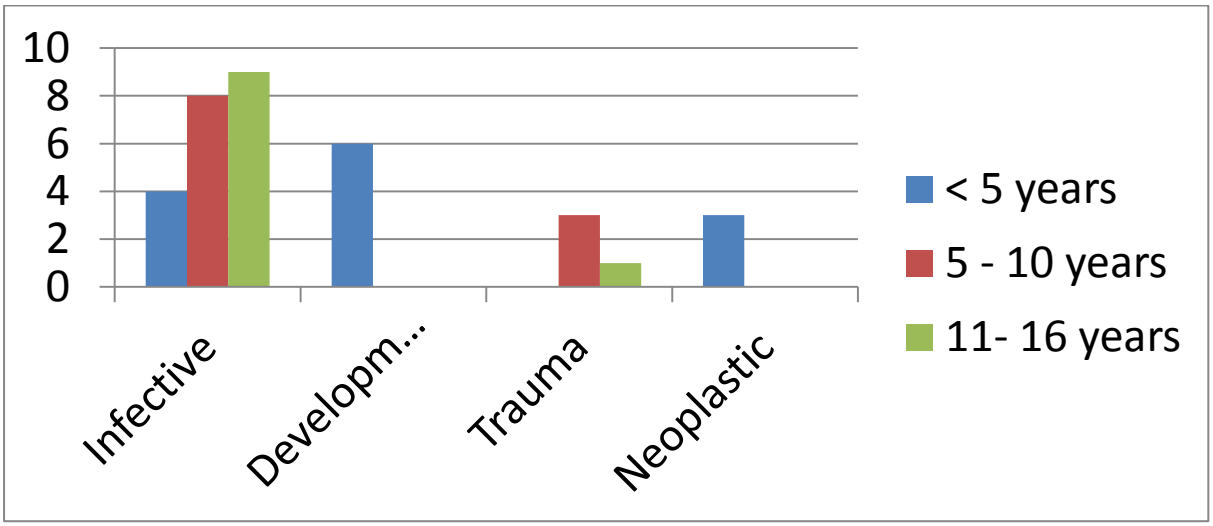


Out of 36 nephrectomies, 62% were performed for NFK secondary to chronic infections. 18% of nephrectomies were due to developmental defects. 9% had malignancy.

Majority of the neprectomies on histopathology shows features of chronic pyelonephritis - which is the commonest cause of the nephrectomy in children. Urinary tract infection has been considered as important risk factor for development of chronic pyelonephritis and renal insufficiency.

Neglected pelvi ureteral junction obstruction was noted in 12 patients. The mean age of the patients with VUR was 3.6 years and 6-8 years in patients with PUJO. Other benign conditions where nephrectomy was indicated included duplicate urethral 4% and posterior urethral valve 2.5%. Among neoplastic group of 8 patients, 4 patients had wilm's tumors with age ranged between 5 months to 7 years, 2 patients had mesoblastic nephroma, and 2 patients had cystic renal dysplasia of the kidney as per **Graph - 4**.

Graph – 4: Age related pathological lesions.



Discussion

The incidence of nephrectomy performed for congenital diseases is presently about 31% among the pediatric patients. Thus early detection of disease remains unsatisfactory because of atypical cause and absence of pathognomonic symptoms but in spite of the development of anti-natal diagnostic methods, the higher incidence of nephrectomy for congenital disease still persists [8]. Because of the relatively high frequency in society, there is a great deal with the congenital malformations of urinary system. Chronic pyelonephritis is the commonest cause of end stage renal failure [9].

In one study inflammatory conditions are restricted with renal parenchymal infections. It is usually believed that recurrent infections are the basic cause of chronic pyelonephritis. There is a little evidence that UTI causes progressive renal damage without VUR in infants and children.

Conditions such as UTI and VUR, can present normal renal development and cause renal injury.

Early diagnosis of PUJO and prompt interventions is mandatory to prevent or minimize renal damage [10]. Our study correlated well with the study conducted by G. Dinizet, et al. as per **Table – 1**. [5].

Table – 1: Comparison of present study with other.

Study	Developmental	Infective	Traumatic	Neoplastic	Renal calculi
Present study	06 (15%)	27 (68%)	04 (10%)	03 (7%)	Not available
G . Diniz et al	21 (28.4%)	44 (59.5%)	04 (5.4%)	Not available	05 (6.7%)

The delay between diagnosis and the onset of symptom is common particularly in the female patients. This may be attributed to older practices where the investigations were performed after the first episode of urinary infections in males, but only after 2 or more episodes in females. Patients with neoplastic lesions i.e., both benign and malignant tumors are treated with immediate nephrectomy [11].

The removal of the kidney leads to structural and functional changes in the remaining kidney. It is important that the children who have a solitary functioning kidney have long term follow up until; they reach adulthood because they could experience subtle renal deterioration at that time or latter in adult life [12].

In many infections related diseases, nephrectomy can be avoided with early diagnosis and adequate treatment. Chronic pyelonephritis due to obstructive nephropathy is the main indication for nephrectomy in one study followed by neoplastic lesions [13].

Conclusion

It remains to be seen whether more effort for management of infections will reduce the incidence of nephrectomy in future. When compared to adults, pediatric kidney has the remarkable ability to recover its function after reconstructive surgeries. So children with antenatal detected malformations are advocated reconstructive surgery instead of nephrectomy and for localized tumours partial nephrectomy can be advised.

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