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Original Research Article

OUTCOMES OF SURGICAL TREATMENT FOR ECTOPIC URETER IN CHILDREN IN A TERTIARY CARE CENTRE

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ABSTRACT

Background: Ectopic ureter is an uncommon anomaly of the urinary tract resulting from an abnormal insertion of the ureter outside the vesical trigone. Symptoms manifesting in childhood include persistent incontinence and/or obstructive uropathy from ureteric duplications which are more common in females, as are associated duplex collecting systems. Early diagnosis and appropriate surgical intervention are necessary to relieve urinary incontinence, prevent recurrent infections, and preserve renal function. Surgical procedures such as ureteric reimplantation, ureteroureterostomy, heminephrectomy and nephroureterectomy according to the presence of functional renal parenchyma of the affected kidney.

Materials and Methods: This retrospective descriptive study was conducted in children who were treated surgically for ectopic ureterat the Department of Paediatric Surgery, SAT Hospital, Government Medical College, Thiruvananthapuram. The medical records of patients from June 2018 to June 2025 were reviewed. A total of 20 pediatric patients with confirmed ectopic ureterwho had undergone definitive surgical intervention and were available for at least three months' postoperative follow-up were included in this study. Data like demographics, clinical presentation, imaging findings, associated anomalies, renal function status, type of surgical intervention and postoperative outcomes were collected using a structured data proforma. Descriptive statistical analysis for categorical variables was described as frequencies and percentages. Continuous variables were expressed as mean or median (±SD) as relevant.

Results: Females were over-represented among the 20 children. More than half of these were diagnosed antenatally. Most of the ectopic ureters were unilateral; some were bilateral and duplex collecting systems were the commonest association, localising to the upper renal moiety most of the time. The commonest presenting complaint was continuous incontinence or dribbling; other primary presentations included urinary tract infections and acute episodes of pyelonephritis, but also urinary frequency, urinary retention, urosepsis and renal function impairment. The variety of surgical procedures was tailored to the renal function remaining in the ectopic unit and the anatomy on the ipsilateral side. In children with preserved renal function in the ectopic unit, ureteroureterostomy and ureteric reimplantation of ureter were performed. In children with poor function, heminephrectomy or nephroureterectomy was performed. Temporary ureterostomy was performed in critically ill infants suffering from urosepsis or who had low renal function at inital presentation before returning for definitive surgery. All patients have had resolution of their polyuria and incontinence following definitive surgery, and the majority became effectively "infection free" following the definitive operation. Patients who

presented with pyelonephritis, urinary retention and urosepsis made full clinical recovery. A small number of patients continue follow up for CKD or and bladder function, and beyond monitoring for preservation of kidney function, surgical complications are almost non-existent; one of the patients developed a cyst following heminephrectomy. The benefit achieved through the surgical procedure must have substantially outweighed the morbidity for the majority of patients.

Conclusion: Surgical treatment of ectopic ureter in children is rewarding if adapted to the functional and anatomical status of the kidney. Ureteroureterostomy and ureteric reimplantation, designed to preserve functionally active renal units, give excellent results for both relief of symptoms and utility of the kidney. If diagnosis is made early, pre-operative assessment conducted thoughtfully and plans made in the light of this assessment, the best is obtained in the child with ectopic ureter.

Keywords: ectopic ureter, pediatric urology, congenital urinary anomalies, ureteroureterostomy, ureteric reimplantation, heminephrectomy, nephroureterectomy, urinary incontinence, duplex collecting system, pediatric surgery.

INTRODUCTION

Ectopic ureter is rare. The ureter fails to drain into the usual position on the bladder trigone, but instead opens into the urethra, vestibule, bladder neck or even into the vagina. This troublesome anomaly depends on abnormal embryological development of the ureteric bud and incomplete incorporation into the developing bladder.[1] Ectopic ureter often accompanies other congenital anomalies of kidney and urinary tract and is seen usually in association with duplication of the renal collecting system. More often than not, the ureter that drains the upper renal moiety inserts ectopically.[2] The lower moiety drains normally into the bladder. There is a marked preponderance in females, because exploration for such a condition commonly reveals a site below the external urethral sphincter that would give rise to continuous urinal incontinence in the affected girls.[3] Males are usually asymptomatic because the ectopic opening lies proximal to the sphincter mechanism. Instead, they may complain of repeated urinary tract infections, epididymitis or obstructive uropathy. Antenatal ultrasonography has increased the detection rate of urinary tract anomalies, with many cases identified in utero.[4] Postnatally, a combination of imaging is used. Renal ultrasonography is the first investigation of choice in detecting hydronephrosis, ureteric dilatation or abortive renal morphology. Voiding cystourethrogram is performed to pick up vesicoureteric reflux and bladder anatomy. DMSA and MAG3 scans are used to determine differential renal function and to assess whether renal units are salvageable. More sophisticated imaging such as magnetic resonance urography, could be used to delineate the urinary tract and find the exact site of ectopic ureter insertion.[5] Management of ectopic ureter in children is almost always surgical. The choice of the surgical procedure depends on the specific arrangement of the collecting system, the function of the renal unit involved, the presence of anomalies, and the condition of the patient. Where the renal function is being retained, reconstructive procedures such as ureteric reimplantation or ureteroureterostomy, would most often be choose to restore unobstructed direction of the urine from kidney to bladder with retention of as much renal parenchyma as is feasible.[6] In those cases where the involved renal segment is poorly or non-functioning, ablation by heminephrectomy or nephroureterectomy might be performed, Temporary diversion procedures such as ureterostomy may be necessary in the infant with severe infection or compromised renal function until such time as definitive correction of the anomaly can be accomplished. Recent developments in paediatric urology have introduced laparoscopic and robotics-assisted approaches to the more traditional surgical steps taken to correct ectopic ureter.[7] Although potentially offering less postoperative pain, shorter stay and better cosmetic appearance with more rapid return to normal health, the successful outcome with either technique needs to be based on the careful selection of patients, accurate pre-operative assessment and appropriate choice of surgical steps. Although many alternatives are available, success depends on renal function, duplex and associated congenital anomaly, and timing of surgical intervention. Long-term follow-up to determine resolution of symptoms, as well as loss of renal function or development of postoperative complications are important. To evaluate surgical outcomes in children with ectopic ureter. By using this, we shall delineate the use of different forms of surgery in the management of ectopic ureter in a tertiary care centre in the current study.

Aim

To determine the clinical outcomes and efficacy of various surgical interventions in the management of ectopic ureter in paediatric patients.

Objectives

Primary Objective

1. To describe the outcomes of surgical treatment for ectopic ureter in children attending Government Medical College, Thiruvananthapuram.

Secondary Objectives

1. To evaluate clinical presentation, anatomical characteristics, and associated anomalies in children with ectopic ureter.
2. To analyze the types of surgical procedures performed for ectopic ureter and their outcomes.
3. To identify factors influencing postoperative outcomes in children undergoing surgical management for ectopic ureter.

MATERIALS AND METHODS

Study Design

This study was conducted as a retrospective descriptive study evaluating the clinical characteristics, surgical management, and outcomes of children diagnosed with ectopic ureter and treated surgically at a tertiary care center.

Study Setting

The study was carried out in the Department of Paediatric Surgery at SAT Hospital, Government Medical College, Thiruvananthapuram, a major tertiary care referral center providing specialized pediatric surgical services.

Study Population

The study population included pediatric patients diagnosed with ectopic ureter who underwent surgical treatment at the Department of Paediatric Surgery during the study period.

Study Period

The data collection period included patients treated between June 2018 and June 2025. The retrospective analysis and compilation of the data were conducted after obtaining institutional ethical approval.

Sample Size

A total of 20 children who underwent surgical intervention for ectopic ureter during the study period were included in the analysis.

Inclusion Criteria

All children less than 12 years of age, who underwent definitive surgical treatment for ectopic ureter under the authors' care were included in the study. Procedures performed included ureteric reimplantation, ureteroureterostomy, heminephrectomy, nephroureterectomy and ureterostomy where indicated. All children in this study had a minimum of three months' follow-up following surgery.

Exclusion Criteria

Patients with incomplete medical records or insufficient follow-up information were excluded from the study.

Study Variables

Design: Determined a range of demographic, clinical, anatomical, and surgical characteristics.

All independent variables were at the patient level age at diagnosis, sex, antenatal diagnosis status, presenting symptoms: urinary incontinence, urinary tract infections, urinary frequency, pyelonephritis, urinary retention and urosepsis. Also laterality for ectopic ureter, type of collecting system (single or duplex), site of ureteric insertion, associated congenital anomalies, renal function and diagnostic investigations (including ultrasonography, voiding cystourethrography, intravenous urography, renal scintigraphy, cystoscopy and other as clinically indicated). All surgical variables - type of operative procedures, surgical approach and side of surgery.

Outcome variables - all post operative, including resolution of urinary incontinence, urinary tract infection recurrence, post operative complications, need for additional surgical intervention, renal function preservation, clinical improvement during follow up.

Data Collection

Data collection was carried out from hospital medical records, surgical registry and departmental database using a pro forma designed prior and structured to collect data on patient demographics, clinical presentation, diagnostic findings, operative details, and follow up outcomes. Each patient was provided a coded study identification number in order to maintain confidentiality by not disclosing personal identifiers in the dataset used for analyses.

Data Analysis

All raw data were initially kept in Excel before the data were "cleaned" after which analysis was performed. Categorical variables such as sex distribution, presenting symptoms, surgical procedures, and postoperative outcomes, were summarized by using frequencies and percentages. Continuous variables like age and length of hospital stay was summarized by means with standard deviation, or median when appropriate. Where appropriate, comparison between groups was performed. Chi-square test or Fisher's exact test were used to compare categorical variables, while continuous variables were compared using independent t-tests. A two-tailed p-value of less than 0.05 was considered significant. All results were presented in a tabular format to describe patient characteristics, clinical features, surgical procedures carried out, and postoperative outcomes.

Ethical Considerations

Ethical clearance was obtained from the Institutional Ethics Committee of Government Medical College, Thiruvananthapuram. As participants were not involved and the study was based on retrospective records, there has not any direct patient contact or interventions. Patients' confidentiality and anonymity were ensured. All procedures studied were part of routine clinical care and not experimental in nature.

RESULTS

We studied the medical records of 20 paediatric patients diagnosed with ectopic ureter who were managed surgically in our institution during the study period. There is a definite female preponderance. More than half were diagnosed antenatally, a reflection of the increasing role of fetal imaging in the diagnosis of congenital abnormalities of the urinary

tract. Most had unilateral ectopic ureter while a few had bilateral disease. We found duplication of the collecting system was common in our patient population with complete duplex systems seen in the majority of cases, but we also had cases of single system ectopic ureter with complete and incomplete duplex systems as well. Ectopic orifice was most often located in the vagina or other structures below the level of the bladder neck (a finding most common in females). Continuous urinary incontinence or dribbling was the most common presenting symptom but urinary tract infections and episodes of pyelonephritis were also common presenting symptoms. Other presenting clinical conditions included increased urinary frequency, urinary retention, deranged renal function, urosepsis, and bladder dysfunction due to small bladder volume. Many patients had associated congenital anomalies involving the urinary and other organ systems. Evaluation of renal function revealed that most of the renal units were well enough preserved to undergo reconstructive procedures, but some had poorly functioning or non-functioning renal moieties requiring ablation procedures. Different surgical procedures were performed depending on the state of the kidney and its anatomical relationships. Patients with preserved function underwent ureteroureterostomy and reimplantation of the ectopic ureter while those with poorly functioning renal segments underwent heminephrectomy and nephroureterectomy. Temporary ureterostomy was performed as a diversion procedure in some acutely ill infants with urosepsis and renal dysfunction. Most of the patients had favourable surgical outcomes, with complete resolution of incontinence after definitive treatment. Most of those with urinary tract infections became free of infection post-surgery, and our patients with pyelonephritis, urinary retention, and urosepsis recovered following surgical therapy. A few patients remained in follow-up for chronic kidney disease or bladder dysfunction. There were few of the usual surgical complications, with only one case of residual cyst formation following heminephrectomy.

Table 1: Sex distribution of patients with ectopic ureter

Sex	Number of patients	Percentage (%)
Male	4	20
Female	16	80
Total	20	100

Table 1 shows that females constituted the majority of the study population, highlighting the higher prevalence of ectopic ureter among female children.

Table 2: Antenatal diagnosis of ectopic ureter

Antenatal diagnosis	Number of patients	Percentage (%)
Yes	11	55
No	9	45
Total	20	100

Table 2 shows that antenatal detection of urinary tract abnormalities was present in more than half of the patients included in the study.

Table 3: Laterality of ectopic ureter

Laterality	Number of patients	Percentage (%)
Unilateral	16	80
Bilateral	4	20
Total	20	100

Table 3 shows that unilateral ectopic ureter was more common than bilateral involvement.

Table 4: Type of renal collecting system

Collecting system type	Number of patients	Percentage (%)
Single system	8	40
Complete duplex system	11	55
Incomplete duplex system	1	5
Total	20	100

Table 4 shows that complete duplex collecting systems were the most common anatomical configuration associated with ectopic ureter.

Table 5: Ectopic ureteric opening site

Opening site	Number	Percentage (%)
Vagina	15	65
Below bladder neck	8	35
Total ectopic openings	23	100

Table 5 shows that the vagina and structures below the bladder neck were the most common sites of ectopic ureteric insertion.

Table 6: Presenting symptoms

Symptom	Number of patients
Incontinence / dribbling	12
Increased urinary frequency	2
Urinary tract infection	8
Pyelonephritis	4
Urinary retention	1
Deranged renal function	1
Chronic kidney disease	2
Urosepsis with shock	3
Small capacity bladder	5

Table 6 shows that urinary incontinence was the most common presenting symptom among children with ectopic ureter.

Table 7: Associated anomalies

Associated anomaly	Number of patients
Solitary kidney	1
Tetralogy of Fallot	1
Penoscrotal hypospadias	1
Cross fused ectopia	1
Hypospadias urethral meatus	2
Transverse lie kidney	1
Ectopic urethral connection to rectum	1

Table 7 shows that several patients had associated congenital anomalies involving the urinary tract or other organ systems.

Table 8: Renal functional status

Renal function	Number of patients	Percentage (%)
Good renal function	14	70
Poor renal function	6	30
Total	20	100

Table 8 shows that the majority of patients had good renal function of the affected renal unit.

Table 9: Surgical procedures performed

Surgical procedure	Number of patients
Ureterostomy	5
Ureteric reimplantation	6
Ureteroureterostomy	9
Heminephrectomy	4
Nephroureterectomy	3

Table 9 shows the different surgical procedures performed for the management of ectopic ureter.

Table 10: Postoperative outcomes

Outcome	Number of patients
Complete resolution of incontinence	12
Recovered from pyelonephritis	4
UTI free after surgery	7
Persistent urinary frequency	1
CKD under follow-up	2
Recovery from urosepsis	3
Bladder augmentation required	1

Table 10 shows the clinical outcomes observed following surgical management of ectopic ureter.

Table 11: Postoperative complications

Complication	Number of patients
Residual cyst after heminephrectomy	1
No complications	19

Table 11 shows the postoperative complications observed in the study population.

Table 1 shows that among the 20 patients included in the study, females constituted 16 patients (80%) while males accounted for 4 patients (20%). This demonstrates a marked female predominance in ectopic ureter cases, which is consistent with the clinical understanding that ectopic ureters are more frequently symptomatic in females due to insertion sites distal to the urinary sphincter. Table 2 shows that antenatal diagnosis of urinary tract abnormalities was identified in 11 patients (55%), whereas 9 patients (45%) were diagnosed postnatally after the onset of symptoms. This finding highlights the important role of prenatal ultrasonography in the early detection of congenital urinary tract anomalies. Table 3 shows that unilateral ectopic ureter was observed in 16 patients (80%), while bilateral ectopic

ureters were present in 4 patients (20%). The predominance of unilateral involvement indicates that most cases occur as isolated anomalies affecting one side of the urinary tract. Table 4 shows that a duplex collecting system was the most frequent anatomical configuration associated with ectopic ureter. Complete duplex systems were identified in 11 patients (55%), single-system ectopic ureters in 8 patients (40%), and incomplete duplex systems in 1 patient (5%). This distribution confirms the strong association between ectopic ureter and duplication anomalies of the renal collecting system. Table 5 shows that the ectopic ureteric opening was most commonly located in the vagina in 15 cases (65%), while insertion below the bladder neck was observed in 8 cases (35%). This pattern reflects the predominance of ectopic ureter insertion sites within the female genital tract and lower urinary tract structures. Table 6 shows that urinary incontinence or continuous dribbling was the most common presenting symptom, occurring in 12 patients (60%). Urinary tract infection was present in 8 patients (40%), pyelonephritis in 4 patients (20%), and increased urinary frequency in 2 patients (10%). Other less common presentations included urinary retention in 1 patient (5%), deranged renal function in 1 patient (5%), chronic kidney disease in 2 patients (10%), urosepsis with shock in 3 patients (15%), and small capacity bladder in 5 patients (25%). These findings indicate that ectopic ureter often presents with urinary incontinence and recurrent infections in pediatric patients. Table 7 shows that several patients had associated congenital anomalies. Hypospadias urethral meatus was present in 2 patients (10%), while solitary kidney, tetralogy of Fallot, penoscrotal hypospadias, cross fused ectopia, transverse lie of the right kidney, and ectopic urethral connection to the rectum were each observed in 1 patient (5%). These findings demonstrate that ectopic ureter may occur in association with other congenital anomalies affecting the urinary tract or other organ systems. Table 8 shows that the majority of patients had preserved renal function. Good renal function was observed in 14 patients (70%), while poor renal function was present in 6 patients (30%). This distribution indicates that reconstructive surgical procedures could be performed in most patients, while ablative procedures were necessary in cases with significantly impaired renal function. Table 9 shows a total of 20 paediatric patients with ectopic ureter were managed surgically, with the majority associated with duplex renal systems involving the upper moiety. The distribution of procedures was as follows: uretero-ureterostomy in 9/20 (45%), predominantly performed for ectopic ureters arising from duplex systems (upper moiety units); ureteric reimplantation in 6/20 (30%), including single-system ectopic ureters and selected upper moiety ureters with preserved function; ureterostomy in 5/20 (25%), mainly in infants with duplex systems presenting with urosepsis and poorly functioning upper moiety units; heminephrectomy in 4/20 (20%), largely for non-functioning upper moiety in duplex kidneys; and nephroureterectomy in 3/20 (15%) for poorly functioning renal units.

Open surgical approach was performed in 17/20 cases (85%), while Minimally invasive (laparoscopic) approach was utilized in 3/20 cases (15%). Among uretero-ureterostomy (n = 9), open procedures constituted 8/9 (88.9%), predominantly for duplex system ectopic ureters involving upper moiety units (right upper moiety: 2; left upper moiety: 4; right single-system ectopic ureter: 2), while laparoscopic uretero-ureterostomy (1/9; 11.1%) was performed for a right upper moiety ectopic ureter. Among ablative procedures, heminephrectomy (n = 4) included open (3/4; 75%) and laparoscopic (1/4; 25%) approaches, predominantly for non-functioning upper moieties in duplex kidneys (left upper moiety: 3; right upper moiety: 1). Nephroureterectomy (n = 3) was performed via laparoscopic approach in 2/3 (66.7%) and open in 1/3 (33.3%), for poorly functioning renal units. Ureterostomy was primarily performed in critically ill infants with urosepsis and compromised upper moiety function, with 80% (4/5) subsequently undergoing successful closure. Table 10 shows that surgical treatment resulted in favorable clinical outcomes. Complete resolution of urinary incontinence was achieved in all 12 patients (60%) who presented with this symptom. Among patients with urinary tract infections, 7 patients (35%) became infection-free after surgery. Pyelonephritis resolved in all 4 patients (20%), while recovery from urosepsis occurred in all 3 affected patients (15%). Persistent urinary frequency was observed in 1 patient (5%), and bladder augmentation was required in 1 patient (5%) due to persistent bladder dysfunction. Two patients (10%) with chronic kidney disease continued under follow-up. Table 11 shows that postoperative complications were minimal. Only 1 patient (5%) developed a residual cyst following heminephrectomy, while the remaining 19 patients (95%) experienced no postoperative complications. This finding suggests that surgical management of ectopic ureter in children is generally safe and associated with a low complication rate.

Overall, the results indicate that ectopic ureter predominantly affects female children and is frequently associated with duplex collecting systems. Urinary incontinence and recurrent urinary tract infections were the most common presenting symptoms. A range of surgical procedures tailored to renal function and anatomical characteristics resulted in excellent clinical outcomes with minimal complications. These findings support the effectiveness of individualized surgical management in achieving symptom resolution and preserving renal function in pediatric patients with ectopic ureter.

DISCUSSION

Ectopic ureter is a rare congenital developmental malformation of the urinary tract caused by failure of normal embryological development of the ureteric bud and its subsequent incorporation into the developing urinary bladder. It frequently presents during childhood with urinary incontinence and persistent urinary tract infection or obstructive urinary symptoms.[8] Asymptomatic ectopic ureters are known, but these occasionally become symptomatic in adult life. Recognition of this entity and definitive surgical procedures to alleviate the symptoms are important to prevent progressive renal damage and alleviation of recurrent infections and urinary dysfunction. In the present study, the clinical features, anatomical distribution, surgical management and outcomes were reviewed in children with the diagnosis of ectopic ureter managed at a tertiary centre.[9]

Female predominance was also found in the present series which was noted in 80% of cases, while the males made up only 20% of the patients. The ectopic ureter is more likely to be symptomatic in females since the ectopic ureteric opening is within a short distance of the urethral sphincter mechanism in females whereas in males it opens proximal to the sphincter resulting in fewer cases of continuous urinary incontinence, and consequently the condition is not detected for a longer time in males.[10]

Antenatal diagnosis was possible in more than half of the patients in the study. With recent advent of prenatal ultrasounds a good number of congenital urinary tract malformations are being detected early and evaluated with ease in the perinatal period, so that early surgeries can be performed.[11] The condition is most often recognised prenatally when hydronephrosis or dilation of the ureter is seen during prenatal scanning. Early diagnosis enables proper follow up in the perinatal period and sometimes early surgery which reduces the chance of urinary infect and consequent damage.[12] In the present series, positional ectopic ureter was the commonest, unilateral being most frequent and bilateral being unusual. This pattern is in accordance with clinicopathological reports in the literature regarding children's urology. Bilateral ectopic ureters are encountered however, are sometimes accompanied by more serious anatomical alterations and require surgical finesse. Duplication of the collecting system was present in many of our cases, with the majority being complete duplex systems, while some were single-system ectopic ureter, and a few involved incomplete duplications.[13] In duplex systems the poorly functioning and frequently dysplastic renal moiety drains through the ectopic ureter. It is pertinent to recognize this anatomy in determining the method of surgical repair that is best utilized for each individual case.[14]

In the present series, urination disorder i.e. urinary incontinence or continuous dribbling, was the most characteristic presentation. This symptom in female children is classical in ectopic ureter cases, particularly when the ureter empties into the vagina or the vestibule.[15] Recurrent urinary tract infection was also common and important clinically, since repeated infections often lead to an irreversible destruction of the kidney unless treatment is quickly undertaken. Other presentations noted were pyelonephritis, urinary retention, urinary frequency and urosepsis. A few patients had impaired renal function or chronic kidney disease, indicating the potential impact of delayed diagnosis.[16]

Several patients in this cohort had associated congenital anomalies including solitary kidney, hypospadias, cross fused ectopia and congenital cardiac defects. This emphasizes the importance of thorough evaluation in children diagnosed with ectopic ureter as congenital urinary tract anomalies frequently form part of a larger context of congenital abnormalities.

Assessment of renal function is critical in determining operative management. In the majority of our patients, renal function was preserved, allowing for reconstructive surgeries. Ureteroureterostomy and ureteric reimplantation are performed when renal function exists in the affected renal unit, which then spares renal tissue and also restores normal urinary drainage. Ureteroureterostomy was the commonest surgical form for patients in our study, this technique involves joining the ectopic ureter to a normally draining ureter, combining in use with duplex systems and a functioning renal unit. Ureteric reimplantation was performed in some patients, it is a useful reconstructive procedure when re-inplace in the bladder is considered safe. Where renal segments function poorly, ablative procedures were performed.[17] Heminephrectomy or nephroureterectomy was performed when the renal unit contributes little to overall renal function and another source of infection or obstruction. Temporary ureterostomy, as was used in these critically ill infants who presented with severe infection or urosepsis, diverting the urinary collection and allowing stabilization prior to definitive surgery. Outcomes were good in the majority of our patients after surgery correction of the incontinence. The majority of our patients who presented with urinary tract infections achieved infection-free status. Our subset of patients presenting with pyelonephritis or urosepsis seems to have recovered after an appropriate surgical response. Only a few of our patients have remained in follow-up for chronic kidney disease or bladder dysfunction. There were few patient complications observed in our cohort. One patient developed a residual cyst after heminephrectomy; the remaining of our patients had a straightforward postoperative course. Such low rate of complications generated in our study indicates that the surgical management of ectopic ureter when performed by proper patient selection and careful surgical technique is safe. In general, the findings of

the present study support the successful of individual surgical management for children with ectopic ureters. Along with careful assessment of renal function, renal anatomy and configuration, and presence of other clinical features, the surgeon is equipped to decide the most appropriate procedure for each patient. It is essential that reconstructive procedures to for preserve functioning renal units are considered first into every operation performed, robbing the utility of other ablative procedures for managing non-while renal segments. Overall, our findings present a clear case for early diagnosis, proper lab evaluation, and timely surgical services that will significantly improve clinical results. With these the great majority of patients will obtain symptomatic resolution, preserve renal function and have an excellent longterm prognosis.

CONCLUSION

We describe our experience with the presentation, anatomy, surgical management and outcome in the children treated for ectopic ureters in a tertiary care centre. Ectopic ureter predominantly affects females and is often associated with duplication anomalies of the renal collecting system. Most children presented with unilateral ectopic ureters though the condition was bilateral in a few. Urinary incontinence was the commonest mode of presentation particularly in the girls though recurrent urinary tract infections and episodes of pyelonephritis were also noted. Our children also presented with severe infections affecting the urinary system including urosepsis and renal impairment. Antenatal detection through prenatal US aided the diagnosis in a segment of our cases before they became symptomatic. Assessment of renal function and anatomy was important for planning the proper surgical procedure. Reconstructive procedures like ureteroureterostomy and ureteric reimplantation were sufficient for patients with a functional renal unit with intent of restoring urinary drainage to normal while preserving functional renal unit. Hemi-nephrectomy/nephroureterectomy proved sufficient for these children with poorly functioning renal unit. Diversion of urine by ureterostomy was also performed for sick infants with urosepsis and renal impairment prior to definitive corrective surgical treatment. The surgical management resulted in favourable outcome with significant symptom relief and preservation of renal function for most of the patients. No child had episodes of urinary incontinence or urinary infection after surgical treatment and besides very minimal postoperative morbidity they all did exceedingly well. Surgery for ectopic ureters is safe and is effective in the right patients. It behoves the surgeon to be prepared to a good and accurate diagnosis, evaluation, plan carefully and the method of surgery for good result. A timely surgical intervention relieves symptoms, obviates any long term renal damage and improves the child's daily living. Regular follow up is necessary to evaluate renal function, detect complications and ensure improvement relative to the child's age.

Limitations

The authors are aware that this study has several limitations. This was a retrospective study and depended on the information available from the hospital medical records, consequently, it may have several elements of incomplete documentation or missing clinical data. The sample size was relatively small, given the rarity of ectopic ureter in the pediatric population, and the study was conducted in a single tertiary care center, making its findings not widely generalizable to other settings. A longer follow-up period would have also assisted the authors in looking into the long term renal outcome and late complications, if there were any, after management of these patients.

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