

# MINIMALLY INVASIVE APPROACH FOR PAEDIATRIC URETERIC CALCULI

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## ABSTRACT

*Objective* To find out the efficacy and safety of ureteroscopy in the management of paediatric ureteric calculi in terms of stone clearance rate and hospital stay.

*Study design* Descriptive study

*Place & Duration of study* Department of Urology Chandka Medical College Larkana, From January 2006 to October 2008

*Patients and Methods* All children with ureteric calculi were thoroughly examined. Blood CP, blood urea, serum creatinine, ultrasound KUB and IVP were carried out in all. They underwent URS. 8.5 FR (Wolf) ureteroscope was used. Stones were broken down with Swiss lithoclast There was no rigid protocol for placement of ureteric stent but ureteric catheter was placed in all. Follow up x-ray KUB was done in all the children to find out the clearance of stone fragments.

*Results* During the study period nineteen children with mean age of 7 years (range – 5 year to 12 years) having ureteric calculi of 7 mm to 1.2 cm (average size - 1cm) were managed. In most of the cases the stone were in the lower one third of the ureter.. Presenting symptoms were abdominal pain in 7 (36.84%), dysuria in 4(21.05%), haematuria in 3(15.79%) and recent episodes of urinary tract infection in 5(26.32%) children respectively.

In 10 (50.54%) calculi were on right side. In 17 patients stones were located in lower 1/3 while in 2 patients stones were present in both the ureters. In two patients repeat ureteroscopy was required as initially ureteroscope could not be negotiated hence ureteric catheter was left for 48 hours. Successful stone clearance was achieved in 95%. One child developed haematuria. No long term complication was found during the study.

*Conclusion* Ureteroscopy is safe and effective management for ureteric calculi in children.

*Key words* Ureteroscopy, Ureteric calculi, Pediatric urolithiasis.

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## INTRODUCTION:

The surgical management of urolithiasis has undergone dramatic shift in the last 30 to 40 years. Therapy historically consisted of open surgical procedures and lengthy hospital stay. This approach has now largely been replaced by minimally invasive procedures that are performed on outpatient basis, with similar efficacy

and less morbidity. Included in these therapeutic options are extracorporeal shock wave lithotripsy (ESWL), percutaneous nephrolithotomy (PCNL) and ureteroscopic treatment of stones. While these treatment options have become standard of care in adult population, the same has not been applied to the paediatric population frequently.<sup>1</sup>

Traditionally the standard treatment of ureteric calculi in children has been surgical removal. During the last one to two decades advances in technology and emergence of smaller and more versatile endoscopes have enabled endourologists to apply their skills to the treatment of paediatric stone disease.<sup>2</sup> In 1988, Ritchey et al<sup>3</sup> pioneered the use of ureteroscopy for extracting the lower ureteric calculi in children and since then other workers have advocated ureteroscopy as an acceptable method for treating ureteric calculi at various levels using small ureteroscopes in children.<sup>4,5</sup> In this small series we analyzed the results of ureteroscopy in children with ureteric calculi to evaluate the safety and efficacy of the procedure.

#### **PATIENTS AND METHODS:**

Between January 2006 to October 2008, 23 ureteroscopies were performed in children for primary ureteric calculi at the department of Urology, Chandka Medical College Larkana. All patients underwent blood CP, renal function tests, urine DR. culture and sensitivity, ultrasound KUB and IVP. The indication for ureteroscopy was ureteric calculi with diameter between 07mm to 1.2cm. Injection gentamycin 2mg/kg body intravenous, was given prophylactically in all children at the time of the induction of anaesthesia.

The technique of ureteroscopy in children was essentially similar to that used in adults. The Wolf 8.5Fr straight ureteroscope was used. All the ureteroscopic procedures were performed using general anaesthesia. Ureteroscope was passed and ureteric orifices were visualized and 3 - 4 Fr ureteric catheter was passed into ureteric orifices to lift the ureteric orifice and to make it negotiable as well as a guide for ureteroscope. We did not pass guidewire prior to ureteroscopy as we did not have fluoroscope in our set up. In none of the patients active ureteral dilatation was done. Stone fragmentation was done by Swiss lithoclast. After fragmentation of stones ureteric catheter was left. The ureteric catheters were removed after 24 to 48 hours and stents were removed after 03 weeks. All the patients had a plain abdominal x ray on following day to exclude the presence of residual fragments and the position of stent, if used.

#### **RESULTS:**

Total number of patients managed with ureteroscopic approach were 19. There were 10(52.6%) girls and

09(47.4%) boys. Mean age was 07 years with range of 05 to 12 years. The presenting symptoms were abdominal pain in 7(39.82%), dysuria 4(21.04%), haematuria 3(15.78%) and recurrent episodes of UTI in 5 (28.30%) children respectively. In 10(52.26%) children stones were on right side and in 7 (39.82%) on left side alone. In 2 children stones were bilateral. In one of these patients single stone was present in lower third on right side and other in middle third on left side, while in other patient stones were in lower on third.

In two patients ureteric catheters were left in to dilate the ureter (as ureteroscope could not be negotiated). After 48 hours repeat ureteroscopy was performed and stones were fragmented successfully. In two children, having bilateral ureteric stones, stents were placed which were removed after three to four weeks while in rest of the cases only ureteric catheters were left in and removed after 24-48 hours. Over all stone free rate after initial fragmentation was 88%, later it was about 95%. No major complication occurred in this small series. Two patients developed high grade fever post operatively and treated according to culture and sensitivity report. Three patients developed haematuria which subsided after 48 hours with the use of diuretics. No ureteric perforation occurred noted in this study. In ten patients hospital stay was 24 hours whose stones were cleared and in seven patients it was 48 hours. Only in two patients it exceeds more than 72 hours as repeat ureteroscopy was required.

#### **DISCUSSION:**

Urolithiasis is the most common urological problem in our part of the world. It equally affects the adults and children though some authors reported the increased incidence of paediatric urolithiasis in last decade from 0.1% to 5%.<sup>6</sup> Technological advances during the last decade have led to the development of newer modalities of treatment for ureteric calculi. Although these newer techniques, e.g ESWL and ureteroscopy, have been accepted for management of ureteric calculi in adults, their use in children has been gradual. This is because the safety of these methods in children were questionable. Ureteroscopy is technically demanding, particularly in younger children because the urethra and ureter are of small caliber. The main difficulty is usually encountered while negotiating the ureteroscope through the intra mural ureter.

Since its first description by Ritchey et al in 1988, the adoption of paediatric ureteroscopy has been slow due to initial limitation of instrument size and optical image quality as well as concerns regarding ureteral ischaemia, injury, perforation, ureteral stricture and induction of vesicoureteral reflux from manipulation of small caliber

paediatric ureters.<sup>7</sup> Continued advances in ureteroscopy technology has allowed for production of small caliber of ureteroscope with enhanced visual optics ideally suited for paediatric ureteroscopy, encouraging to move towards ureteroscopy as first line treatment of ureteric calculi in children.<sup>8 9 10</sup>

Many authors have reported active ureteral orifice dilatation with either serial ureteral dilators or concentric balloon dilatation with low complication rates.<sup>11</sup> We prefer to avoid any active ureteral dilatation that may lead to ureteral trauma therefore we put ureteral catheters for 48 hours where ureteral orifice was not negotiated. It provided safe and effective alternative in achieving access to paediatric ureters. This version is highly supported by other authors as well.<sup>12</sup> With regard to efficacy, our experience reinforces the high success rates reported by other authors.<sup>13 14</sup>

All the patients with stone burden up to 1cm were stone free in first session as confirmed by post operative x-ray while in patients with stone burden exceeding 1cm, became stone free in following few weeks and overall success rate was 95% in our series. In our series we have selected most of the children having lower ureteral calculi because of initial experience and to prevent possible complications in upper ureteral calculi. Other investigators also have some reservations treating the upper ureteral calculi in terms of success and complications.<sup>15 16</sup> We have used pneumatic lithotripsy for the fragmentation of stones and found it highly successful while in most of the series laser lithotripsy has been used.<sup>17 18</sup> The success rate with laser is also between 90 to 97% which is slightly better to that of our results but the cost of the laser does matter in our situation.

In terms of overall safety paediatric ureteroscopy has been validated as a safe modality by several authors with complication rate ranging from 1.3 to 5%.<sup>19 20</sup> In our small series though we limited our self in most of the cases to lower ureteral calculi, the complication rate was almost negligible and the ratio was comparable with above investigators. We found ureteroscopy with pneumatic lithotripsy, an effective and safe way to treat stones in children with minimal complications and decreased hospital stay.

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