

Paediatric Ureterolithotripsy: Tips and Tricks – Experience at a Single Center

Milind Prabhakarrao Joshi, Priti Subhash Zade, Bhavesh H. Doshi, Mahendra S. Gavai

Department of Paediatric Surgery, Dr. Ulhas Patil Medical College and Hospital, Jalgaon, Maharashtra, India

Abstract

Background: Paediatric stone disease is very common in certain regions of India. Traditionally, the endourology for the stones even in paediatric age group is managed by adult urologist and paediatric surgeons tend to do open surgeries. The nonavailability of paediatric size equipments and lack of training at the teaching and tertiary care paediatric surgical centers in India are factors due to which there is continued apathy of paediatric surgeons to endourology. The aim of this study was to discuss the feasibility of paediatric ureterolithotripsy for successful procedure. We introduced the paediatric ureterolithotripsy as per the predecided indications of stone size up to 15 mm in paediatric ureterolithiasis at a tertiary care center in rural set up. **Subjects and Methods:** Patients up to 18 years of age presenting with ureterolithiasis and not responding to conservative treatment or who needed endourological intervention were included in the study. **Results:** Thirty-one patients underwent uretero lithotripsy (URSL) for ureteric calculus with more than 95% clearance rate. **Conclusions:** Single-stage paediatric ureterolithotripsy is quite feasible and effective in achieving the stone clearance in paediatric ureterolithiasis.

Keywords: Paediatric endourology, ureterorenoscopy, uretero lithotripsy, urolithiasis

INTRODUCTION

Paediatric ureteroscopy and lithotripsy are very fascinating surgery because of the results and patient benefits.^[1] With availability of finer paediatric scopes and LASER, ureteroscopic lithotripsy has really become a good mode of treatment in ureteric calculus in paediatric patients.^[2-4] Paediatric urolithiasis constitutes approximately 10% of outpatient population making it a significant number in this part of the region. We present our experience of the last 2 years from January 2013 to December 2015 about paediatric ureteroscopy and lithotripsy in a newly established paediatric endourology center at a rural medical institution. The stone clearance rate was more than 95%.

SUBJECTS AND METHODS

All the patients diagnosed with ureteric calculi were investigated and complete stone work up was done in all the patients. The stone work up included routine haemogram, serum creatinine, calcium, phosphorous, uric acid, 24 h calcium-creatinine ratio, urinary pH, microscopy,

ultrasound (USG) of the abdomen, X-ray of the kidney, ureter, and bladder and intravenous urography. Optional radiological investigations were noncontrast computerized tomogram, magnetic resonance urography as per the indications. All the patients were first screened with USG.

Inclusion criteria

Those patients having a calculus size up to 15 mm in diameter in any part of the ureter and having back pressure changes or evidence of infection were primarily offered surgery and ureterolithotripsy after the radiological work up. Patients with stone size <6 mm diameter were given conservative treatment in the form of oral antibiotics, anti-inflammatory agents, and alpha 1a inhibitors for 3 weeks and were again investigated by USG. If there was no symptomatic relief or if there were

Address for correspondence: Dr. Miliind Prabhakarrao Joshi, Plot No. 1, Old Postal Colony, Behind Government Polytechnic, Jalgaon - 425 002, Maharashtra, India.
E-mail: milindj79@yahoo.com

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signs of infections, then, again USG was done. If the stone was persistent in position with back pressure changes, surgery was advised.

Exclusion criteria

Those children who had a calculus size >15 mm diameter were not offered the option of uretero lithotripsy as the primary treatment.

The procedure was performed under spinal anesthesia with supplemented general anesthesia. All the patients were operated by same surgeon to maintain the uniformity. All the patients first underwent cystoscopy using 6/7.5 fr integrated paediatric cystoscope. The ureteric opening was identified and cannulated with no 4 fr ureteric catheter and 0.025 mm diameter safety guide wire was passed into the renal system under fluoroscopic guidance bypassing the stone. Care was taken not to dislodge the stone upward by the guide wire by blind pushing. 6/7.5 fr or 4.5/6 fr paediatric ureteroscope was introduced depending on the size of the ureteric orifice and its pliability. No patient required dilatation of the ureterovesical junction as the scope could be passed easily without resistance. The stone was visualized and uretero lithotripsy was done using pneumatic lithoclast or holmium LASER lithotripsy. The stone was broken into fine pieces and gravel and all the pieces were retrieved and sent for stone analysis. The gravel was left to drain by the urine flow [Figures 1-6]. After clearance of the ureteric stone, renoscopy was performed to confirm the clearance and to rule out upward migration of the stone. If the total duration of the ureteroscope inside was more than 30 min, if there was lot of ureteric mucosal edema and stone load, if the stone was impacted, or if there were signs of infection during ureteroscopy, then double J stent was placed at the end of the procedure. The double J stent was removed after 1 month by cystoscopy as a day care procedure.

RESULTS

A total of 31 patients underwent ureterorenoscopy and lithotripsy. Eighteen patients were male and rest female.

The age range was from 18 months to 17 years. The average stone size was 10 mm with the range of 6–15 mm. Sixteen patients had calculus in the lower ureter, ten patients had mid ureteric calculus and five patients had upper ureteric calculus [Table 1]. In half of the patients, there was family history of similar complaints. The average duration of

Table 1: Patient profile

Age (years)	Sex	Size (mm)	Position	Stent
3	Male	8	Right lower	Yes
4	Male	10	Right lower	Yes
5	Male	9	Left mid ureter	Yes
5	Male	8	Left lower ureter	No
6	Female	10	Right mid ureter	Yes
8	Female	12	Right proximal ureter	Yes
10	Female	15	Left mid ureter	Yes
12	Female	13	Left lower ureter	Yes
15	Female	14	Left proximal ureter	Yes
18	Male	12	Right lower ureter	Yes
16	Male	14	Left lower ureter	Yes
15	Male	10	Left lower ureter	No
12	Male	10	Right lower ureter	Yes
8	Female	9	Right mid ureter	No
10	Male	10	Left mid ureter	Yes
12	Female	10	Left mid ureter	Yes
13	Male	10	Right mid ureter	No
11	Female	9	Left lower ureter	No
5	Female	10	Right proximal ureter	Yes
1.5	Male	8	Right proximal ureter	Yes
4	Female	6	Lower right ureter	No
6	Female	8	Left lower ureter	No
8	Female	10	Left mid ureter	Yes
12	Male	10	Left mid ureter	Yes
14	Male	10	Left lower ureter	No
15	Male	10	Right lower ureter	No
16	Male	9	Right lower ureter	No
10	Male	10	Left lower ureter	No
7	Male	10	Left mid ureter	Yes
8	Male	11	Left proximal ureter	Yes



Figure 1: Right mid ureteric calculus (preoperative)



Figure 2: After URSL with double J stent *in situ*



Figure 3: Right lower ureteric calculus (preoperative)

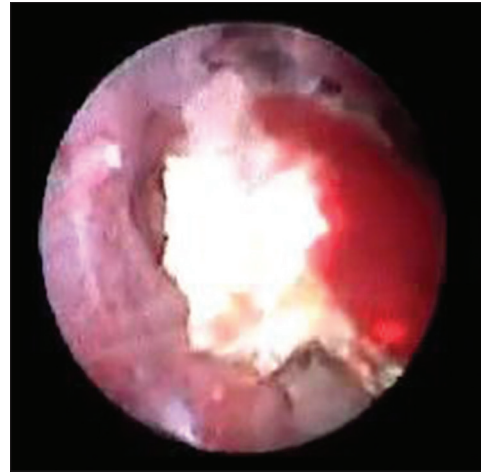


Figure 4: Ureteroscopic view of the calculus before lithotripsy



Figure 5: Left lower ureteric calculus (left kidney showing faint nephrogram suggesting severe obstructive uropathy)



Figure 6: After clearance of calculus with stent *in situ*

symptoms was 5 days with a range of 2 days to 21 days. The stone clearance by URSL was more than 95%. One patient required two sittings of URSL and one patient required conversion to open procedure for residual stone. In 19 patients, double J stent was placed at the end of URSL which was removed after 1 month as a day care procedure. Stone analysis revealed calcium monooxalate and dioxalate in most of the patients. Few patients had mixed stones and triple phosphate stones. The average duration of the procedure was 40 min with range of 20 min to an hour.

DISCUSSION

The goal of stone management should be maximum clearance with minimum renal or ureteral damage. Urolithiasis is one of the important etiological factors of end-stage renal disease and hence, the complete clearance is necessary.^[3,4] Paediatric urolithiasis has known risk of lifetime recurrence; hence, endourological procedures are more useful rather than open procedures.^[4] Paediatric ureteroscopy is evolving rapidly due to advances in the technology and instrumentation.

Most of the procedural protocols are derived from adult ureteroscopy with few modifications. It is quite clear that ureteroscopy can be done safely and effectively in children of all the age groups. The success rate of stone clearance is as good as at any center.^[5-7]

We found that all the stones of size >6 mm would need surgical intervention because stones ≥ 6 mm has less chance of getting passed spontaneously or on medical management.^[7-10]

We compared our results with those of the other paediatric ureteroscopy articles. The stone clearance rate, age of presentation, and size of stones in our study and other published articles are in the similar range.^[11-14]

Some centers routinely do the preoperative double J stenting to dilate the vesicoureteric junction and definitive procedure is done after one to 2 weeks of stenting. The main argument given in favor of preoperative stenting is that it prevents the forceful dilatation of vesicoureteric junction and future possible risk of reflux. However, we have found that preprocedural double J stenting is not necessary with the availability of the fine ureteroscope which does not need any

vesicoureteric junction dilatation. This avoids one procedure and anesthesia and cost of the treatment and time also. We recommend that preoperative stenting should be reserved for those with severe urosepsis, solitary functioning kidney with sepsis, or when the surgical intervention is getting delayed for any reason.

However, our patient database is one of the largest, especially compared with the group at New Delhi and Chennai in India, who had previously studied the paediatric URSL.^[14]

Other important differences in our study and the above-mentioned study are that we do not advocate routine double J stenting in all the patients and follow the criteria as mentioned in the material and methods, regarding the postprocedural double J stenting. This has reduced the burden of second procedure of double J stent removal after a month.^[14]

We follow our patients with every 6 monthly USGs to look for stone recurrence and to rule out ureteral dilatation in the postoperative period.

Ureteroscopy in children is not mere extension of cystoscopy and it definitely has a learning curve and expertise required for it. However, in expert hands and proper case selection, it is an integral part of the management of urolithiasis in children.^[2,7-9] However, one has to take into consideration the cost of instrumentation and all the other paraphernalia of stone management in paediatric urolithiasis. Hence, it is prudent to perform this procedure only at centers having reasonable case numbers and at low volume centers it can be economically cumbersome.

CONCLUSIONS

Ureteroscopic lithotripsy is quite feasible and successful procedure for the clearance of ureteric calculi. Preoperative ureteric stenting is not mandatory in all the patients before ureteroscopy rather it should be patient specific. All the patients after ureteroscopy do not need stenting. Initial cost of purchasing the instruments and other devices, lack of proper training of endourological procedures in the curriculum of

paediatric surgery are the present big hurdles in acceptance of these procedures at present.

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Conflicts of interest

There are no conflicts of interest.

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