Original Article

Efficacy and safety of pneumatic lithotripsy in pediatric vesical stone

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Objective: To determine the efficacy and safety of pneumatic lithotripsy in the management of pediatric vesical stones at our center.

Methodology: This case series study was conducted at the department of urology, Islam Medical and Dental College/teaching hospital, Sialkot, Pakistan. A total of 73 children, aged 5 to 12 years, stone size 5mm to 1.5 cm with negative urine culture prior to operation were enrolled from March 2015 to March 2019. Mean age, mean hospital stay, mean operation time, presenting clinical features and post-operative complications, rate of stone-free and fragmentation completion post-operation were recorded.

Results: Mean patients age was 8.37±2.534 years, while mean size of stone was 1.04±0.29cm. Peak age for stone was between 5 to 8 years. Mean hospital stay was 1.04±0.7 days and mean operating time was 39.03±16.5 minutes. Four (5.5%) patients developed hematuria and four (5.5%) had urine retention and six (8.2%) developed dysuria. 97.3% patients were stone-free after the procedure and complete fragmentation was accomplished in all cases.

Conclusion: Pneumatic cystolithotripsy is relatively safe and efficient technique for vesical stones in children with only very minor complications occurring after the procedure. (Rawal Med J 202;45:728-730).

Keywords: Pneumatic lithotripsy, vesical stone, hematuria.

INTRODUCTION

Humans have been affected by urolithiasis since early history as its presence is evident in Egyptian mummies as well as mentioned in Hippocratic Oath.[1] Endemic areas for urolithiasis have a high prevalence for pediatric urolithiasis.[2,3] Pakistan is included among the countries having consistent high incidence of bladder stones.[4] Etiology remains vague and the incidence of pediatric urolithiasis is on the rise.[5,6] Recurrence rate of pediatric urolithiasis is very high and significant morbidity and surgery related mortality is associated with it.[7,8] Clinical presentations are varied in children, so management has to be modified accordingly.[9,10] Cystolithotripsy is the endoscopic management of the vesical calculi by using stone punch, using ureteroscope and pneumatic lithoclast system.

Endoscopically, using pneumatic lithoclast, force is generated and transmitted through a metal probe to the stone, which gets fragmented. The relatively big fragments are removed using forceps. The tiny gravel or dusty concretions are either washed and removed via feeding syringe at the end of operation or left in bladder which pass in the urine by normal voiding act.[3,4] Advances in technology, miniaturization of endoscopic equipment and growing experience of urologists has encouraged use of highly efficient ureterorenoscopic lithotripsy for pediatric vesical stones. We studied the efficacy and safety of pneumatic lithotripsy in management of pediatric vesical stones in our tertiary care center.

METHODOLOGY

This cases series study was conducted at department of urology, Islam Medical and Dental College teaching hospital, Sialkot from March 2015 to March 2019. Approval from Institutional Ethical Committee was taken for this study and Informed written consent was sought from parents/guardians of all participants. A sample size of 73 was calculated by taking confidence interval as 95%, margin of error as 5% and incidence of vesical stones in children as 5%.[12] Non-probability consecutive sampling was employed.

All 73 children were male, aged 5-12 years, with vesical stone of 5mm to 1.5cm confirmed via ultrasound and x-ray KUB, and had negative urine culture prior to operation. Patients with bigger stones and having coagulopathy, genital abnormality, metal stenosis, urethral stricture, ureteric or vesicoureteric junction stone were excluded. Patients with musculoskeletal deformity, disturbed renal functions, having vesical stones in augmented bladder, and patients having difficult urethral access, were also excluded.

Statistical Analysis: Data were analyzed using SPSS version 20. Rate of stone-free and fragmentation completion post-operation are described as frequencies and percentages.

RESULTS

Overall, mean age of the patients was 8.37±2.534 years while mean size of stone 1.04±0.29cm. Mean operation time was 39.03±16.5 minutes whereas mean duration of hospital stay was 2.4±0.7 days (maximum 3 days). Poor urinary stream was the most common presenting complaint noted in 16 (21.9%) while dribbling of urine was observed in 12 (16.4%) cases (Table 1).

Table 1. Presenting complaints.

Presenting Complaints	Number (%)
Straining during micturition	9 (12.3%)
Urinary retention	2 (2.7%)
Poor urinary stream	16 (21.9%)
Milking of penis (pain)	9 (12.3%)
Hematuria	8 (11.0%)
Frequent urination	11 (15.1%)
Dribbling of urine	12 (16.4%)
Crying during micturition	6 (8.3%)

Table 2. Post-operative complications.

Complications	Number (%)
None	59 (80.8%)
Hematuria	4 (5.5%)
Retention of Urine	4 (5.5%)
Dysuria	6 (8.2%)

Stone clearance was noted among 71 (97.3%) children and retreatment was required in two (2.7%). We noted 59 (80.8%) cases had no post procedure complication while minor complications like dysuria and macroscopic hematuria were seen in 6 (8.2%) and 4 (5.5%) cases respectively (Table 2). There were no long term complications recorded in the patients.

DISCUSSION

Pneumatic lithotripsy is a fast, safe and minimally invasive technique in operating bladder calculi due to new and upgraded miniaturized instruments.[13] Furthermore sensitive fine-caliber and flexible ureteroscopes with better-quality optical lenses with supporting high-power laser equipment's are now used.[14,15] In our pediatric data of 73 males, the peak age group for bladder calculi was between 5 to 8 years, noted among 60.3% cases. Khosa et al recorded similar peak age of 5 years in 66% cases of their cohort.[4] Tasian et al recorded younger patients with mean age of 3.8 years in their cohort.[7] Multiple studies have found metabolic abnormalities as the most common etiology.[6,16]

Common clinical symptoms we noted were poor urinary stream (21.9%) followed by dribbling and frequent urination and pain during voiding, same was reported by Sharma et al.[17] But Makkawi et al recorded suprapubic pain, burning micturition and hematuria as the presenting feature of pediatric vesical stone.[18]

The mean hospital stay observed was 2.4 days and the mean operation time was 39 minutes. Similar duration was reported by Ahmed et al.[19] However, much lesser mean duration of operation as 27 minutes was described by a study with mean duration of hospital stay of 1.23±0.65 days.[20] Salah et al reported mean duration of hospital stay as 2.7 days.[21] We kept patients for 24 hours under observation until they full recover from general anesthesia to manage any nausea, vomiting or fever.

In our cohort, stone clearance was 97.3% while only 2.7 % had to be re-treated. Stone clearance of 90% was recorded by Rana et al.[22] Complication rate of 19.2% was recorded in our study, Sheikh et al had only 6% of cases of complications post procedure.[23] Kareem and Abd noted low complication rates and concluded this method was effective and safe.[24]

Limitation of our study is that we included only male patients and that the exact cause from

idiopathic and metabolic etiology was not investigated due to constraints of laboratory limitations. Multi-centric large trials are needed to support our findings.

CONCLUSION

Pneumatic cystolithotripsy is a relatively safe and efficient technique for vesical stones in children with only very minor complications occurring after the procedure.

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