Comparison between Transurethral Holmium :YAG Laser Cystolithotripsy and Percutaneous Suprapubic Cystolithotomy in the Management of Bladder Stones in Children

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ABSTRACT:

BACKGROUND:

Vesical stones in children are common in developing countries. Historically, open cystolithotomy has been the treatment of choice in the management of bladder calculi. Recently there are different treatmrnt of vesical stones like Transurethral Holmium laser cystolithotripsy and Percutaneous cystolithotripsy.

OBJECTIVE:

To Compare between transurethral Holmium :YAG laser cystolithotripsy and percutaneous suprapubic cystolithotomy in the management of bladder stones in children.

PATIENTS AND METHODS :

A total of 33 children (31 boys and 2 girls) with vesical stones were treated at Urology Department of Al-Sadder Medical City in Najaf between January 2013 and June 2014 . Mean patient age at the time of diagnosis was 4.2 years (range 8 months to 10 years). The patients were divided into 2 groups according to the procedure of stone removal. Group 1 (15 patients) underwent percutanous suprapubic cystolithotomy and group 2 (18 patients) underwent transurethral Holmium :YAG laser cystolithotripsy. Stone size ranged from 7 to 25 mm (mean 16.2mm).

RESULTS:

Operative time ranged from 10 to 25 minutes (mean 18 minutes) in percutanous suprapubic cystolithotomy (group 1) and was ranged from 15 to 70 minutes (mean 30 minutes) in transurethral Holmium :YAG laser cystolithotripsy (group 2). The day of catheter removal was 24 to 96 hours (mean 36 hours) in group 1, while it range 0 to 48 hours (mean 8 hours) in group 2. The hospital stay was shorter after transurethral Holmium :YAG laser compared to percutanous suprapubic cystolithotomy (30 vs. 72 hours). No significant intraoperative or postoperative complication was encountered except prolong urinary leak in two patients (13.3) in group 1 and transient mild haematuria in three children (16.6%) and low grade fever in two children (11%) in group 2. In all cases (100%) the stones were removed successfully in first session in group 1 while one patient (5.5%) need second session due to residual small stone in group 2.

CONCLUSION:

Transurethral Holmium :YAG laser and percutanous suprapubic cystolithotomy management of vesical stones in children are efficient, with a low incidence of complications. Transurethral Holmium :YAG laser offers a shorter hospital stay and urethral catheterization but longer operative time compared to percutanous suprapubic cystolithotomy.

KEYWORDS: vesicalstone, holmium:yaglaser, percutanous suprapubic,cystolithotomy, cystoscope.

INTRODUCTION:

Vesical stones in children are much more common in boys than in girls, with ratios ranging from 9 : 1 to as high as 33 : 1 in areas of India.

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Stones are usually solitary and, once removed, rarely recur.[1]

Bladder stones are more often found in children from developing countries, are composed of ammonium urate, and are thought to be related endemically to malnutrition.[2]In contrast, among

children from industrialized nations, bladder stones are most often found in those with spinal cord injuries and/or congenital abnormalities such as spina bifida. Very often these children have undergone augmentation cystoplasty and/or manage their bladders by clean intermittent catheterization. It has been reported that up to 50% of those children with reconstructed bladders will develop a bladder stones in their lifetime, the majority of which are of struvite composition.[3]

Children with primary bladder calculi rarely present acutely. They often complain of vague abdominal discomfort, dysuria, frequency and hematuria. Pulling of the penis is considered by some to be pathognomonic because it indicates the child is suffering from stranguria. Frank urinary retention is very rare.[1]

Historically, open cystolithotomy has been the treatment of choice in the management of bladder calculi. Open cystolithotomy, while successful, is associated with the need for prolonged catheterization, increased length of hospital stay,and poor cosmesis from the required incision .[1]

Transurethral cystolithotripsy is an alternative, but it is not ideal in many children due to their smaller urethral caliber or previous bladder neck reconstruction. Modern series report the use of the holmium laser, electrohydraulic lithotripter and lithoclast technology, all with success in both adults and children.[1] However, in addition to the need for multiple probes, electrohydraulic energy is associated with a higher incidence of complications, including mucosal injury and hematuria .

Holmium laser lithotripsy has become the modality of choice, owing to its ability to treat large calculi while incurring a minimum of collateral damage. Most patients undergoing laser lithotripsy will be rendered stone free in one procedure with no major complications.[1] The use of a side-firing laser is favored by some, owing to increased stability and maneuverability of the fiber as well as shorter operative times.[1]

Percutaneous cystolithotripsy, however, is now utilized worldwide with advantages including shorted hospital stay, improved cosmesis, and a reduction in indwelling catheter duration postoperatively. [4] Currently, percutaneous cystolithotripsy has evolved as the preferred method to treat bladder stones that have formed in native and reconstructed bladders.[5]

PATIENTS AND METHOD:

A total of 33 children (31 boys and 2 girls) with vesical stones were treated at Urology Department of Al-Sadder Medical City in Najaf between January 2013 and June 2014. The diagnosis of vesical stones and its measure was made by clinical and radiological investigations including ultrasound scan and plain abdominal radiograph and confirmed at time of operation by cystoscope. Stone size ranged from 7 to 25 mm (mean 16.2mm).Urinary tract infection was treated preoperatively with appropriate antibiotic. The patients were divided into 2 groups according to the procedure of stone removal:

Transurethral Holmium:YAG laser: The procedure was done under general anesthesia in lithotomy position ,an operating cystoscope 8-9.8 Fr with an off-set eye-piece was used because its central working channel allowed a straight insertion of the laser fiber. holmium laser energy (0.6-1.8 J/pulse at 5-12 Hz) was applied through a 550-mum fiber.

Complete stone clearance by dusting was assured during the procedure. Post-operatively, patient not catheterized. or a Foley catheter left in for few hours.

Percutaneous suprapubic cystolithotomy :The procedure was done under general anesthesia in lithotomy position.The bladder was distended with saline. 1 cm incision was made 1 to 2 cm above the pubic symphysis. The laparoscopic port (5mm) was introduced into the bladder through a suprapubic incision under cystoscopic guideness and the stone removed by using dormia basket , then the small suprapubic incision is closed by single stitch .Foley catheter was inserted through the urethra into the bladder .The procedure was done without fluoroscopy.

Success rate, operative time, complication and hospital stay were compared between two procedures.

RESULTS:

A total of 33 children with vesical stones were treated at Urology Department of Al-Sadder Medical City in Najaf between January 2013 and June 2014. Of these children, 31 were boys and 2 girls in a ratio 15.5:1. Mean patient age at the time of diagnosis was 4.2 years (range 8 months to 10 years).

Table I:Patient characteristics by treatment approach.

Patient characteristics	Percutanous cystolithotomy	Transurethral Holmium
Number of patients	15	18
Sex of patients	M=15, F=0	M=16 , F=2
Age of patients	Mean 4.1 years	Mean 4.3 years

Operative time was ranged from 10 to 25 minutes (mean 18 minutes) in percutanous suprapubic cystolithotomy (group 1) and was ranged from 15 to 70 minutes (mean 30 minutes) in transurethral Holmium :YAG laser cystolithotripsy (group 2).

Table II: Operative time of the procedures (in minutes).

Procedure	Operative time
percutanous cystolithotomy	10 to 25 minutes (mean 18 minutes)
Transurethral Holmium :YAG laser	15 to 70 minutes (mean 30 minutes)

The duration of urethral catheterization was 24 to 96 hours (mean 36 hours) in group 1, while it range 0 to 48 hours (mean 8 hours) in group 2.

Table III: Duration of urethral catheterization (in hours).

Procedure	Duration of catheterization
percutanous cystolithotomy	24 to 96 hours (mean 36 hours)
Transurethral Holmium :YAG laser	0 to 48 hours (mean 8 hours)

all cases (100%) the stones were removed successfully in first session in group 1 while one patient (5.5%) need second session due to residual small stone in group 2.

Table IV: Success of the procedures.

Procedure	success of the procedures
percutanous cystolithotomy	100%
Transurethral Holmium :YAG laser	94.5%

DISCUSSION:

Vesical stones in children are much more common in boys than girls. bladder stones more often found in children from developing countries.[1]

Salah MA et al found All patients with vesical stones treated by percutanous cystolithotomy(PCCL) became stone-free. The average operating time was 20 (5-60) minutes. The average hospital stay was 2.7 (2-5) days. No any severe intra- or postoperative complication was observed.[6]

Necmettin penbegul et al found The mean PCCL procedure time was 38.7 min (15-65). The mean hospital stay was 1.4 (0.5-4) days. The stone-free rate after one PCCL intervention was 91.6% and increased to 100% after two sessions of PCCL. The notable complications were transient macroscopic hematuria in one patient and the need for a second session of PCCL in another patient.[7]

Hassan Ahmadnia et al found Percutaneous suprapubic cystolithotripsy is an efficient and safe technique for treating bladder calculi in children, All patients became stone free. The mean operative time was 23.13 minutes (range, 12 to 40 minutes). All patients were discharged 24 hours after operation, except 1, who was hospitalized 2 more days for suprapubic pain and severe irritating symptoms. No significant intraoperative or postoperative complications were seen.[8]

Ramakrishnan PA et al found the mean duration of the transurethral Holmium :YAG laser procedure of vesical stones treatment in children was 38 (range 19-62) minutes while the mean length of hospital stay was 2.2 (range 2-3) days. All the children were rendered stone-free following a single operative session. [9]

Mohammed S. Al-Marhoon et al found that Open and endourological management of vesical stones in children are efficient, with a low incidence of complications. Endourological management

offers a shorter hospital stay compared to open surgery.[10]

In current study, we found both procedures are effective in treatment of vesical stones in children.

CONCLUSION:

Transurethral Holmium :YAG laser and percutanous suprapubic cystolithotomy management of vesical stones in children are efficient, with a low incidence of complications. Transurethral Holmium :YAG laser offers a shorter hospital stay and urethral catheterization but longer operative time compared to percutanous suprapubic cystolithotomy.

Recommendation:

Transurethral Holmium :YAG laser and percutanous suprapubic cystolithotomy management of vesical stones in children are minimally invasive ,efficient, with a low incidence of complications and should be regarded as first line treatment of vesical stones in children.

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