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TRANS URETHERAL CYSTOLITHOTRIPSY FOR BLADDER CALCULI IN CHILDREN

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ABSTRACT:

OBJECTIVE: *To evaluate the effectiveness and safety of transurethral cystolithotripsy (pneumatic) in children with urinary bladder stones as a day care procedure.*
Type of Study: Prospective
PATIENTS AND METHODS: *Management of vesical calculi in children poses challenge to the urologists of developing countries due to their huge burden of these stones. This prospective study was conducted in the department of urology Chandka Medical College and Larkana Medical centre (pvt) Larkana between January 2006 to December 2008. After initial routine investigations, children diagnosed with bladder calculi were admitted two hours before surgery. Stones were fragmented with Swiss lithoclast under general anesthesia using 8.5 FR semi rigid Ureteroscope. Fragments were evacuated with 10.5 FR Cystoscope and Ellick's evacuator. Foleys catheter was retained for 24 hours.*
RESULTS: *Of the 100 children with bladder calculi (M: F ratio 7.3:1) treated with cystolithotripsy using swiss lithoclast, 99% became stones free after one session.95% children were discharged eight to twenty four hours of procedure; however, 5% had minor complications.*
CONCLUSION : *An endemic calculus constitutes 20% of all paediatric workload. Excellent stone free rate with cystolithoclast as daycare procedures with minimal complications make it a preferred treatment for bladder calculi 0.5-2.0 cms size.*

KEY WORDS: Transurethral cysto lithotripsy, Children, Bladder Stones.

INTRODUCTION

Management of vesical calculi in children poses challenge to the Urologists of developing countries due to their huge burden of these stones. Bladder calculi in children remain a major urological health problem in developing countries like Pakistan and constituted 29.2% of all pediatric urolithiasis.[1] This disease is typically seen in children less than 10 years of age, with strong male predominance[2]. Nowadays, vesical calculi are rare in developed world, where it represents 1% to 5% of all urinary tract stones, at the same time; in the developing countries the so called endemic bladder stones are still common in childhood.[3, 4] In the developed countries, the main component of rarely existing urinary bladder stone is struvite; at the same time, in the developing world, the main component is ammonium acid urate. The pathogenesis and biochemical explanation of endemic stone formation remain unclear, but it seems that there is correlation between stone formation and malnutrition, low animal protein intake and vitamin A deficiency. The Common practice in endemic areas is feeding infants with human breast milk, which, in contrast to cow's milk, is low in phosphorus. Such low –phosphate diets result in high peaks of urinary ammonium excretion.[5]

Earlier open cystolithotomy was the only treatment of choice. Open surgery has inherent problems of long scar, prolong catheterization, extended hospital stay and risk of infection[6]. Recently with the advent of new urological armamentarium like ESWL, laser lithotripsy and pneumatic lithotripsy reduced the need for open surgery in vast majority of these children. The aims and objectives of this study are to report our recent experience with pneumatic lithoclast fragmentation of bladder calculi in children transurethrally, and to evaluate its safety and effectiveness as a day care procedure.

PATIENTS AND METHODS

This study included 100 children with endemic bladder calculi, managed by transurethral pneumatic cystolithotripsy (cystolithoclast) at department of urology Chandka Medical

college hospital and Larkana Medical Centre (pvt) during the period January 2006 to Dec 2008. Their age, sex, social class, addresses were noted. History, dietary habits and physical examination was done. Laboratory investigations included blood CP, blood urea, serum creatinine, urine DR and culture. Radiological examination included plain X-ray kidney, ureter, blabber (KUB) and was combined with ultrasound kidneys or X-ray IVU if other urological abnormalities were suspected. After pre-anesthetic evaluation these children were called for transurethral pneumatic lithotripsy (Swiss lithoclast) of blabber stone using 8.5FR ureteroscope. They were admitted 2 hours to 24 hours before operation. Inj Gentamycin 2mg per kg body weight Pre-operative prophylicctally was given. The procedure was done under general anesthesia in lithotomy position. Initial urethrocystoscopy was performed using the paediatric cystoscope to exclude stricture, posterior urethral valves and bladder neck obstruction. The stone was then visualized, size was assessed, bladder mucosa and shape of ureteric orifices examined for any bladder pathology. After initial cystoscopy, 8.5FR semi rigid ureteroscope (Wolf) was passed, stone visualized. Stone was fragmented with pneumatic lithoclast probe. Fragments of stone were evacuated with ellick's evacuator. During fragmentation normal saline was used as an irrigant and small intravenous canula was placed in bladder suprapubically to keep it empty during procedure. After completing the procedure 8-10 FR Foleys catheter was passed. Post operatively these children were kept upto 24 hours in the hospital. Foleys catheter was removed after 24 hours after X-rays KUB. Outpatient follow-up was advised.

Table – I
Complications

S No	Complication	% age
1	Haematuria	10 %
2	Fever	05 %
3	Retention of Urine	03 %
4	Bladder Perforation	02 %

Table – II
STONE ANALYSIS

S No	Type Of Stone	% age
1	Amonium Acid Urate	34 %
2	Amonium Acid Urate + Calcium Oxalate	45 %
3	Calcium Oxalate	08 %
4	Sruvite	07 %
5	Amonium Acid Urate + Uric Acid	04 %
6	Uric Acid	02 %

RESULTS

During the period of study (January 2006-Dec 2008), 100 children with bladder calculi were treated with transurethral pneumatic cystolithotripsy. There were 88 (88 %) males and 12 (12%) females with M: F ratio of 7.3:1. Youngest child was 9 months and oldest 12 years with peak age of 2-5 years. (Figure1). Bladder stone size ranged from 0.5 – 2.0 cm (Figure 2). Pre-operative urine culture was positive in 23% cases and E. coli was the commonest organism identified (Figure 3).All theses children belonged to either rural areas of the country or poor socio economic class, and more than 40% were found to be anemic. After one session of cystolithoclast, 99% children became stone free. Ninety five (95%) were discharged in 24 hours. However five (5%) children remained admitted for more than 48 hrs for some complications (Table 1). The results of stone analysis are shown in Table 2.

DISCUSSION

Bladder calculi in children in the absence of obstruction, infection or neurologic disease are considered to be endemic. These stones have almost disappeared in the western countries but are still frequently encountered in developing countries like Pakistan.

M.Hussain etal(2001) have reported in their study conducted in Sindh Institute of Urology and Transplantation, Karachi that the geographical distribution of pediatric bladder stone is under a transition phase in this country. The children from affluent areas of the city have a decreasing incidence but disease continues to be endemic in rural areas of the country and poor localities of the big cities.[7] In accordance with above study most of the children during this study were also from low socio economic class. Age and sex of children in this study was in agreement with the work of other authors as well.[8] Pre-operative urine culture was positive in 23% of children with E. coli as a commonest organism (58.3%) followed by kliebsiella (28.4%).Which is in agreement with the observation of other studies.[9]

Transurethral pneumatic cystolithotripsy has proven quite effective in fragmenting large, hard bladder calculi with minimal tissue injury in adult but its use in pediatric bladder calculi through transurethral route is not well reported in literature. The main worry in young children was the narrow caliber of urethra and fragment clearance after stone breakage, [10] with miniaturization of ureteroscope and cystoscope size in recent years, this technique can be made applicable to children from 1 to 14 years age. Isen K et;al(2008)and M.H etal;(2001) have broken the bladder stones with swiss lithoclast and used ureteroscope they have reported that ureteroscope itself is of narrow caliber and smooth hence it is safe and none of their patients have developed urethral stricture.[11,12] In accordance with above investigators we have also used ureteroscope and found it urethra friendly and urethral stricture has not developed in any of our patients. Breaking the bladder stone in very small pieces with pneumatic lithoclast made it possible to evacuate fragments with 8.5FR to 14FR cystoscope with gentle wash with Ellicks' evacuator.

Stone analysis done by infrared spectroscopy showed majority of stones to be either ammonium hydrogen urate, or combination of calcium oxalate with ammonium acid urate, although infective and uric acid stones were also seen. This shows pneumatic lithoclast can fragment all types of bladder calculi very effectively.

There are certain other minimal invasive procedures to fragment these bladder stones; every procedure has its own merits and demerits which will be discussed in following paragraphs. Although these procedures were not used during this study, but after reviewing the literature transurethral route, it was found to be more suitable in our setup.

Extracorporeal shock lithotripsy (ESWL) treatment of bladder stones is technically easy method; however its application in children, because of the difficulty in passing

the stone fragments, may query. To reach a high success rate, one needs more sessions in case of large and/or dense stones, but the need for auxiliary procedures and the chance of complications increase as well. SAH. Rizvi, SAA Naqvi; eta l(2003) shows 47% success rate with ESWL while 93% with Transuretheral cysolithtripsy in first session.[13] As most of these patients came from remote villages where there was no health care service within a reasonable distance and thus there were no facilities for correct follow up. Another important reason for using transurethral stone removal as the primary modality is the financial point because parents were able to pay only for one definitive management.

Laser lithotripsyis being advocated as more effective in breaking stones, but it is highly expensive and needs especial training , therefore it cannot be used everywhere .While Pneumatic lithotripter is relatively cheaper and simple in use hence it can be used in Small centers as well.[14]

Morshed A Salah etal; 2005 and other authors are favoring the suprapubic cystolithotripsy/litholipexy to prevent trauma to urethra due to narrow caliber of urethra of children, [15] but the disadvantage is that multiple and expensive instruments are required, though small, but scar will be there and hospitalization time they have reported is about 3-5 days which is not cost effective both for hospital and parents. In our study none of the child developed urethral stricture and were discharged within 24 hours. Therefore we are of opinion that transurethral cystolithotripsy can be done safely in children with stone size up to two cm, early discharge and no scar formation make it more favorable. Our observation is well supported by Mishra K.et al ;(2007) and Manic Ram etal; (2003) who have reported their experience in comparison with suprapubic cystolithotripsy and transurethral cystolithotripsy and favoured the latter if the stone burden is small.[16, 17] Traditional treatment of urinary bladder stones remain open cystolithotomy which is still being performed on large scale in our country as well as in other parts of world, recently Al-Mahron etel;(2009) have compared the results of open cystolithotomy and endourological procedures and are of opinion that from hospital stay point of view endourological procedure is better however open cystolithotomy is safe from complication point of view.[18] In contrast with the above investigator as the complication rate in our series was very minimal therefore transurethral cystolithotripsy can be done safely also if the stone size is up to two cms .

Figure – I
Age and Sex Of Children.

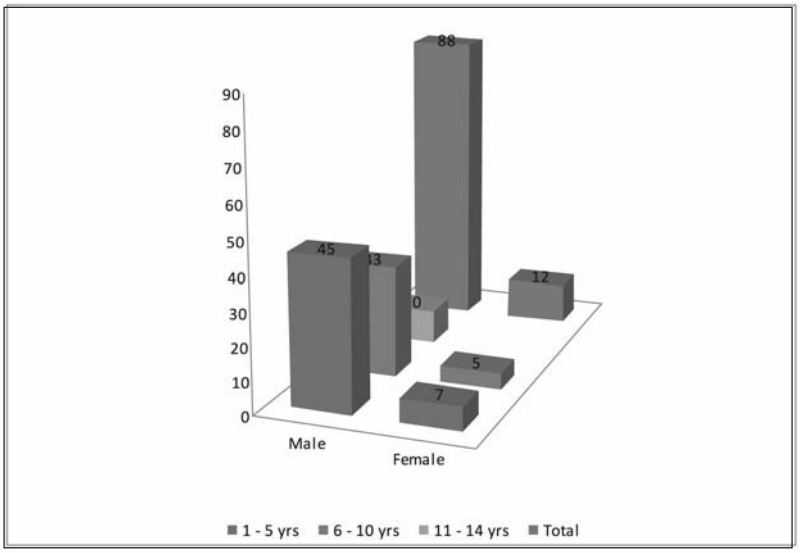


Figure – II
Size of Stones

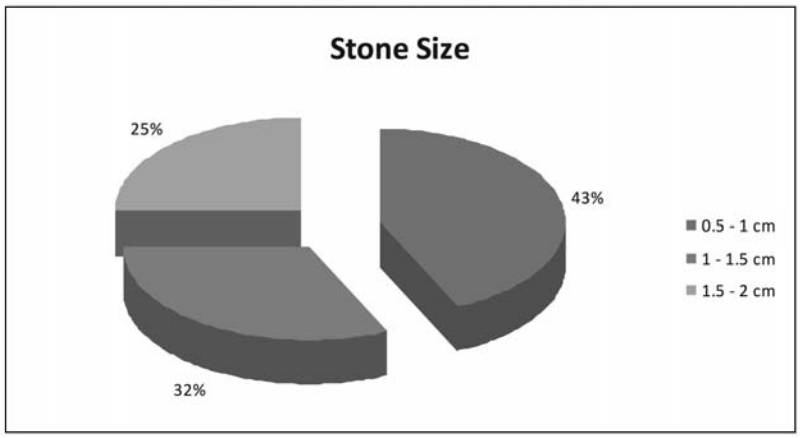
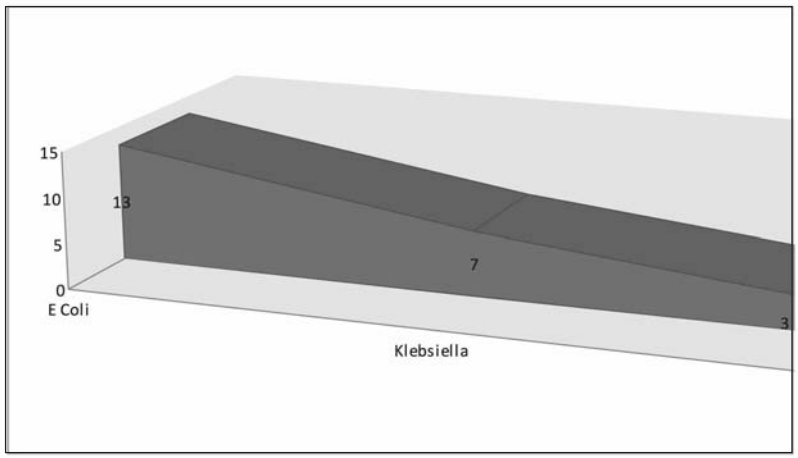


Figure – III
Urine culture Isolates



Negative Culture 77%
Positive Culture 23%

In this study 95(95 %) children were discharged 8-10 hours after operation, making it a day care procedure. It is in accordance with the study of Rashid etal; (2001) who have reported the same in their study[19]. Moreover, a short hospital stay as compared to percutaneous cystolithotripsy and no reported case of stricture urethra in this study has made this procedure a preferred mode of treatment for bladder calculi in children.

CONCLUSION

This study concluded that endemic bladder calculi are still a major urological problem in our part of world. Poor socio economic conditions, malnutrition, dehydration and infection play an important role in the etiology. Excellent stone free rated with transurethral lithotripsy as a day care procedure with minimal complications make it a preferred treatment for bladder calculi of 0.5 – 2.0 cm size in children.

REFFERENCES

1 Hussain M, Lal M,Ali B. Urollithiasis in Sindh. Asingle centre experience with a review of 10,000 cases. J Nephrol urol transplant 2000; 1: 10-13.

2 Kibar Y,Irkilata HC, Coban H, Uildirim I, Dayanc M. Combined use of percutaneous and transurethral instrumentations in preadolescent children with intavesical pathologies. Int urol Nephrol.2007; 39(3):775-8.

3 Faut Demirel ,MD.,Murat Cakan,MD Fatih Yalcinkaya, MD, etal.Percutaneous suprapubic cystolithotripsy approach : For whom? Why? J.Endourology.2006; 20(6):429-31.

4 H.Iman E, Khan AM, Flasko T. Endoscopic management of pediatric urolithiasis in a developing country. Urology 2004;63:159-162

5 Naqvi SA, Rizvi SAH, Shahjehan S. Bladder stone disease in children. Clinical studies. J Pak Med Assoc; 1984; 34:94.

6 Mahran MR, Dawaba MS. Cystolitholipexy versus cystolithotomy in children. J. Endourol. 2000; 14(5):423-5.

7 Hussain M. Endemic Bladder calculi in children. What is current position? Editorial, J Nephrol Urol Transplant2001; 2:1-2.

8 Morshad A. Salah, Endre Holman, Csaba Toth. Percutaneous Suprapubic Cystolithotripsy for pediatric bladder stones in a developing country. Eur Urol 2001; 39:466-470.

9 Acar B, Inci Arican F, Emeksiz S, Dallar Y. Risk factors for nephrolithiasis in children. World J. Urol, 2008; 26(6):627-630.

10 Razvi HA, Song TY, Denstedt JD. Management of vesical calculi, comparion of Lithotripsy devices. J Endo urol 1996; 10(6): 559-63.

11 Isen K, EM S, Kilic V, Utku V, Bogatekin S, Ergin H. Management of bladder stones with pneumatic lithotripsy using a ureteroscope in children. J. Endourol, 2008; 22(5):1037-40.

12 M.Hussain, M.Lal, S.sultan, SA.A.Naqvi and S.A.H Rizvi. Transurethral pneumatic lithotripsy for endemic bladder calculi in children. Journal of nephrology Urology and Transplantation. 2001; 2:56-9

13 S. A. H. Rizvi, S. A. A. Naqvi, Z. Hussain, A. Hashmi, M. Hussain, M. N. Zafar, S. Sultan, H. Mehdi. Management of Pediatric Urolithiasis in Pakistan: Experience with 1440 Children. J. Urol 2003; 169:634-637.

14 Ramakrishnan PA, Medhat M, AL-Bulushi YH, Gopakumar KP, Sampige VP, AL-Busaidy SS. Holmium Laser cystolithotripsy in children: initial experience. Can J. Urol. 2005; 12(6):2880-6.

15 Morshad A. Salah, Endre Holman, Munim Khan, Csaba Toth. Percutaneous cystolithotomy for pediatric endemic bladder stone: experience with 155 cases from 2 developing countries

16 Mishra SK, Ganpule A, Manohar.T, Desai. MR.Surgical management of pediatric urolithiasis.Jndian. J Urol 2007;23:428-34.

17 Manick Ramalingam, Krishnasamy Selvarajan, Kallappan Senthil. A Novel technique of cystolithotripsy for large vesical calculi in children. Peadiatric Endosurgery & Innovative Techniques 2003; 7(3):333-7.

18 Al-Marhoon MS, Sarhan OM, Awad BA,Helmy T,Ghali A, Dawaba MS. Comparison of endourological and open cystolithotomy in the management bladder stones in children. J.Urol.2009; 181(6):2684-7

19 Abdul Rashid Shaikh,Bader fayaz Zuberi, Nisar Ahmed Shaikh, and Abdul Rahim Saiyal. Intacorporeal cystolithotripsy in children. JCPSP 2001; 11(3):156-7.