ORIGINAL RESEARCH PAPER

Volume-7 | Issue-7 | July-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

OUTCOME OF EXTRACORPOREAL SHOCKWAVE LITHOTRIPSY (ESWL) FOR PEDIATRIC RENAL CALCULI: OUR EXPERIENCE

Urology

Dr Nachiket Vyas Professor in The Department of Urology SMS Medical college Jaipur , Rajasthan

Dr Shivam Priyadarshi Sr. Professor in The Department of Urology SMS Medical College Jaipur, Rajasthan

Dr Vishal Kirti Jain* Senior resident in The Department of Urology SMS Medical college Jaipur , Rajasthan
*Corresponding Author

Dr Madan Mohan Agarwal Deputy Superintendent SMS Medical College Jaipur , Rajasthan

ABSTRACT

Extracorporeal Shock wave lithotripsy (ESWL) is an established modality for treating renal calculi in adults. The efficacy of SWL for pediatric calculi has been under scrutiny because of the unknown long term effects of shock waves on developing renal parenchyma. The present study aims at assessing the efficacy of SWL for pediatric renal calculi and also includes renal units with congenital anomalies as malrotation and horseshoe kidney. The study was done between Jan 1998 and June 2006 in 19 children and treated 20 renal units.Complete fragmentation occurred in 18 out of 19 cases (94.75%). 12 patients (63.15%) required 1 sitting whereas 6 (33.33%) required 2 sittings. In the group studied 2 cases of malrotation and 1 with horseshoe kidney were successfully treated. We conclude that ESWL is an excellent modality for treating pediatric renal calculi with minimum morbidity. It can be easily done under sedoanalgesia in children without the need of general anesthesia.

KEYWORDS

ESWL, Pediatric calculi, Fragmentation

1) Introduction

Extra corporeal shock wave lithotripsy (ESWL) has now established role in the management of renal calculi in adults. Controversies of the effect of shock waves on the developing pediatric renal parenchyma lead to its slow evolution for managing renal calculi in this age group. Some researches considered it to be a contraindication in children. Studies have now confirmed that shock waves have no or very little effect on the developing renal parenchyma [1,2,3]. We present our experience of extracorporeal shock wave lithotripsy in pediatric renal calculi.

2) Material and method

Between January 1998 and June 2005, 19 children were treated by SWL for renal calculi. The youngest patient was 3 years and oldest 7.6 years, 18 were male and 1 female. The mean age of the group was 5.9 yrs. All children in the group treated were symptomatic, except for one child whose diagnosis was made incidentally on ultrasound while being evaluated for a non-urological condition. 10 children had flank pain, 5 children had nonspecific symptoms and 2 had recurrent UTI. All children were evaluated before lithotripsy by a scout film of KUB, IVP, MCU and ultrasonography. A total of 20 stones were treated as one patient had bilateral pelvic renal calculi. A metabolic evaluation was done before starting treatment in all patients. The size of the calculi ranged from 10 mm to 27 mm (mean 18.5 mm). The sites of the stones were pelvic in 13, calyceal in 4 of which 2 each were in upper and middle calyx. Two patients had a staghorn calculus. Two children had renal malrotation and one child had a horseshoe kidney. Urine culture sensitivity was done in all cases prior to lithotripsy. E. coli was the most common organism grown. All patients with positive culture were given systemic antibiotics and were undertaken for lithotripsy only after sterile cultures were documented. All patients in the group had a normal serum creatinine before lithotripsy. D.J. Stenting was not done in any patient before treatment.

Lithotripsy was done using the electro-hydraulic, stonelith V5 (PCK electronic industry and Trade co, Ankara, Turkey). A table top made of wood ply and mica was designed so as to allow the children to be positioned comfortably during the procedure. Lung and Genitalia of the patients were protected using Styrofoam pads and heavy lead aprons. Antibiotic prophylaxis with 3rd generation cephalosporin and aminoglycoside was given in all patients.

All cases were done under Sedoanalgesia using midazolam (0.03 mg/Kg), fentanyl (50µg/Kg) and ketamine (0.5mg/kg). Vitals were monitored throughout the procedure. Increments in sedation were made if the child showed any movement during the procedure. Focal point of the calculus was reassessed every 500 shock so as to keep radiation exposure to a minimum. Total number of shock given to the patients were recorded a maximum of 3000 shock were given in one session and a gap period of 2 months was given between sessions. Voltage range was between 12-16 KV. 24 hours after the procedure all patients underwent scout film of the KUB, ultrasound abdomen and urine culture sensitivity. These were done to assess the adequacy of fragmentation and to rule out any complication from the procedure such as peri-renal hematoma. In the present study stone clearance was defined as a stone free rate or residual calculi of ≤ 3mm at 3 months

3) Results

20 renal units in 19 patients were treated in the present study, including a solitary case of bilateral pelvic renal calculi. Complete stone fragmentation occurred in 18 of the 19 patients (94.73%). In one patient the procedure was abandoned as he developed hypotension and bradycardia during the procedure. At 700 shocks the patient had significant fragmentation but child developed sign of septicemia during fragmentation. Procedure abandoned and managed with systemic antibiotics but was subsequently lost to follow up. One sitting was required in 12 patients (63.15%) and 2 sittings were required in 6 children (33.33%). The patient in whom the procedure was abandoned was considered a failure (5. 26%) even though he did not complete therapy. Complete stone clearance was seen in 15 patient and insignificant fragments ≤ 3 mm remain in three.This represented a success of 83.33% and 16.66% respectively in 18 patients. On an average 1600 shocks were required to completely fragment the calculi. In majority of patients stone fragmentation started at approximately 500 shocks. stone fragmentation in children occurs with fewer shocks as compared to adults. This can be explained by the fact that renal calculi in children are detected earlier than adults due to frequent postnatal ultrasound done for urological and non-urological conditions. Earlier detection prevents dense crystallization and impaction of the calculi thus making them more amenable to shock wave lithotripsy. In the 6 patients who required 2 sittings the mean number of shocks were 4400. The relative radio density of calculi in these groups was more in comparison to vertebra as compared to patients whose calculi fragmented in one sitting. Calculi (2 each in upper and middle calyx) fragmented at approximately 1100, 1900, 1700 and 2200 shocks. The sizes of the calculi were 13, 17, 15 and 22 mm respectively. In the present group studied, 2 children had renal malrotation and one had horseshoe kidney.

The calculi sizes were 10 mm, 13mm and 17 mm respectively. The

numbers of shocks required in these patients were 1500, 1600 and 1800 respectively. An ancillary procedure was required in one patient only. This patient had the largest calculi in the present group (size 27 mm). The patient showed excellent fragmentation of the calculi. Complete fragmentation occurred in 2800 shocks but due to resultant steinstrasse ureteroscopy and JJ stenting had to be done in this patient.

Post fragmentation UTI developed in 5 patients that responded well to antibiotics therapy. One patient who developed overt septicemia was lost to follow up and hence did not complete treatment protocol.

4) Discussion

Stone treatment in children by ESWL can be associated with long term renal injury [10]. Radiation exposure, late hypertension, altered renal growth and function are our special concern [11]. Despite these effect of ESWL various author published their experience with ESWL in pediatric population [12, 13, 14]. Now ESWL has become standard of care for pediatric nephrolithiasis since last decade [15]

lithotriptor machine produce shock wave from either Electrohydrolic , electromagnetic or piezoelectric external energy source. High energy shock wave travel in to body and focused on stone. This will lead to fragmentation of stone in small particle. These small fragmented stone particle can easily pass through ureter.[16]

ESWL has now established itself as a primary modality of managing pediatric renal calculi. Various studies support its role and validate excellent results [4,5,6] Extentensive studies have shown that the short and long term effects of SWL on renal parenchyma in not substantially detrimental Long term studies have evaluated the potential damage to parenchyma after lithotripsy. A study by Lottmann HB et al have shown no detriment on long term effects in a study of 15 children who were followed for 1-5 yers using DMSA scan [2].

In the present study 3 children with congenital anomalies (2 with malrotation and one with horse shoe kidney were successfully treated. This is in concordance with reports from slavkovida et al [7]. That shows that SWL has excellent results in treating renal calculi in children with congenital malformations. Shock wave lithotripsy has been found to be effective in children with calculi of size up to 30 mm[8]. In the present study the maximum sized calculus was 27 mm. This calculus fragmented well with resulting steinstrasse for which ureteroscopy and DJ stenting was required. The issue of pre-lithotripsy stenting is controversial. In our experience with adult SWL, we found clearance rates to be similar in Stented and un-stented patients. Due to our own excellent results in un-stented adult SWL, we do not stent our pediatric patients. Al Bisaidy et al reported fewer complications in stented patients [9]. Our own high success rate (94.73%) in the present study has now allowed us to give ESWL as a choice of primary therapy in renal calculi in children.

5) Conclusion

ESWL has been found to be a safe, effective modality for managing pediatric renal calculi. Numerous studies have documented that it has minimal effect on renal parenchyma and does not seen to increase risks of irreversible hypertension. Larger sturdy with longer follow up needed to confirm the long term effect of shock wave on developing pediatric renal parenchyma.

Reference

1) Lottman HB, Archambaud F, Traxer 0, Mercier-Pageyral B, Helal B. The efficacy and parenchymal consequences of extracorporeal shock wave lithotripsy in infants. BJU Int 2000:85(3):311-5.
2) Traxer O, Lottman H, Archambaud F, Helal B, Mercier-Pageyral B. Long-term evaluation with DMSA-Tc 99m scintigraphy of renal parenchymal involvement in children after shock wave extracorporeal lithotripsy. Prog Urol 1998;8(4):502-6.
3) Traxer O, Lottman H, Archambaud F, Helal B, Hercier Pageyral B. Extracorporeal shock wave lithotripsy in infants. Study of its repercussions on the renal parenchyma. Ann Urol (Paris) 1998;32(4):191-6.
4) Krichene A, Fontaine E, Quenneville V, Saety L, Beurton D. Extracorporeal shock wave lithotripsy in children. J Urol 2002;167(5):1264-6.
5) Rodrigues Netto N Jr, Longo JA, Ikonomides JA, Rodrigues Netto M. Extracorporeal shock wave lithotripsy in children. J Urol 2002;167(5):2164-6.
6) Alapont Alacreu JM, Queipo Zaragoza JA, Burgues Crason JP, Broseta Rico E, Serrano Durba A, Boronat Tormo F, Jimenez Cruz JF. Treatment of shock wave lithotripsy in children: Our experience. Actas Urol ESP 2002;26(1):15-9.
7) Slavkovio A, Vlajkovic M, Radovanovic M, Siric Z, Steganovic V. ESWL in the treatment of stone in child with horseshoe kidney. Int Urol Nephrol 2001;32(3):327-9.
8) Ather NH, Noor NA. Does size and site matter for renal stones up to 30-mm in size in children treated by extracorporeal lithotripsy? Urology 2003;61(1):212-5; discussion 215.
9) Al-Busaidy SS, Prem AR, Medhat M. Pediatric staghom calculi: the role of extracorporeal shock wave lithotripsy monotherapy with special reference to ureteral stenting. J Urol 2003;169(2):629-33.
10) Thomas R, Frentz JM, Harmon E, Frentz GD. Effect of extracorporeal shock wave lithotripsy on renal function and body height in pediatric patients. J Urol 1992; 148: 1064 6
11) Kroovand RL. Pediatric urolithiasis. Urol Clin North Am 1997; 24: 173 84
12) Newman DM, Coury T, Lingeman JE et al. Extracorporeal shock wave lithotripsy in children. J Urol 1986; 136: 238 40
13) Sigman M, Laudone VP, Jenkins AD et al. Initial experience with extracorporeal shock wave lithotripsy in children. J Urol 1987; 138: 839 41
14) Kroovand RL, Harrison LH, McCullough DL. Extracorporeal shock wave lithotripsy in childhood.J Urol 1987; 138: 1106
15) Esen T, Krautschick A, Alken P. Treatment update on pediatric urolithiasis. World J Urol 1997; 15: 195 202
16) Matlaga BR, Lingeman JE. Surgical management of upper urinary tract calculi. In: Kavoussi LR, Novick AC, Partin AW, Peters CA editor(s). Campbell-Walsh Urology. 10th Edition. Philadelphia: Saunders Elsevier, 2011