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Outcome of Extracorporeal Shock Wave Lithotripsy For Upper Ureteric Calculi- Experience From North-East Indian City

[1]M S Faridi*, [2]Md Jawaid Rahman, [3]Naloh Mibang, [4]Akoijam Kaku Singh, [5]Rajendra Sinam Singh, [6]Khumukcham Somarendra Singh

[1]MCh ResidentDepartment of UrologyRegional Institute of Medical Sciences, Imphal, Manipur, India
[2]MCh ResidentDepartment of UrologyRegional Institute of Medical Sciences, Imphal, Manipur, India
[3]MCh ResidentDepartment of UrologyRegional Institute of Medical Sciences, Imphal, Manipur, India
[4]Professor Department of Urology Regional Institute of Medical Sciences, Imphal, Manipur, India
[5]ProfessorDepartment of UrologyRegional Institute of Medical Sciences,Imphal, Manipur, India
[6]RegistrarDepartment of UrologyRegional Institute of Medical Sciences, Imphal, Manipur, India

Abstract: *To evaluate the outcome of extracorporeal shock wave lithotripsy (ESWL) for upper ureteric calculi of size ≤ 20mm without ureteral stenting. This was a prospective study conducted in the institute from January 2015 to August 2015. A total of 130 patients aged between 10 and 80 years with upper ureteric calculi underwent ESWL using the Dornier Compact Sigma Lithotripter. Stone size was calculated by measuring the largest dimension of the stone in KUB plain films. In each session, 3000–3500 shocks at frequency 60–90 per min and intensity between1 and 4 were given. A maximum number of five sessions were given. Successful treatment was defined as complete clearance or residual stones smaller than 4 mm on KUB performed 3 months after the first session. Out of 130 patients, the M:F ratio was 1:1.2. The stone size ranged from 5 to 20 mm. The overall success rate was 94.6%. For stones >15 mm, the success rate was only 77.7%. The number of sessions increases as the stone size increased. The most common complication encountered was haematuria.Our study showed ESWL as a primary modality for less than 20mm upper ureteric stones.*

Keywords: *Calculi,Lithotripsy, Ureter*

I. Introduction

Ureteric calculi are a common urological problem across the globe. There is a paradigm shift in the management of ureteric calculi in the last 20 years. Now a day, open surgery for ureteric calculi has been replaced by minimally invasive and non-invasive procedures like extracorporeal shock wave lithotripsy (ESWL) and ureterorenoscopy (URSL)[1–3]. In 1980, Chaussey *et al.* has revolutionized themanagement of urinary tract calculi by the introduction of ESWL [4]. Many studies have recommended ESWL as first line treatment for upper ureteric calculi with a success rate of 80-90% [5-7]. The success of ESWL depends on stone composition, size and its location [8]. ESWL is a non-invasive procedure with less complications but on the other hand even with the advent of small-calibre and flexible ureteroscopes, it is an invasive procedure and associated with complications.

The aim of this prospective study was to assess the success rate of ESWL as a monotherapy for ≤ 20mm upper ureteric calculi and the safety of this therapy without prophylactic DJ stenting.

II. Material and Methods

This was a prospective study conducted in the institute from January 2015 to August 2015.Patients with congenital anomalies of the kidney or who underwent ESWL following percutaneous nephrostomy, any previous surgery, previous stenting, distal ureteral obstruction, bilateral ureteric calculi, abnormal coagulation profile and chronic renal failure were excluded from the study.Total 130 patients of upper ureteric calculi aged between 10 and 80 years were included in the study that fulfilled the criteria. The treatment was carried out using "Dornier CompactSigma Lithotripter (Dornier Medtech, Germany)".

All patients were evaluated with X Ray KUB (kidney, ureter, and bladder), ultrasonography KUB and excretory urography before treatment. Routine investigations like complete hemogram, bleeding Time (BT), coagulation Time (CT), Urine R/E and C/S, Kidney function test (KFT) were done according to hospital protocol. Follow-up monitoring of stone fragmentation and clearance were done using ultrasonography KUB, X Ray KUB at 1-week, 1-month, and 3-month-period. Stone size was calculated by measuring the maximum dimension of the stone on X Ray KUB.

Patients were kept on liquid diet after bowel preparation with 2 tablets of dulcolax and 4 tablets of charcoal previous night after dinner and were given analgesic medication in the form of diclofenac 75 mg intramuscular injection just before starting the session. All patients were treated in supine position with number of shocks per

session ranging from 3000 to 3500 at the frequency of 60–90 per minand intensity between 1 and 4 depending on the tolerance level ofthe individual. Proper antibiotics, analgesics and haemostatics werepreprescribed post procedure to each patient. All patients were discharged on the same day with proper instructions to reporteven the minor complications after treatment. One week after the treatment, X-ray KUB or ultrasound KUB was performed to check the existence of any residual calculi or haematoma formation.Criteria for successful treatment were complete clearance or residualstones ≤4 mm on KUB at 3 months after the first session.A maximum number of five sessions were givenafter which it was labelled ESWL failure.

All statistical analyses were performed using Statistical Package for the Social Sciences (SPSS 21) for windows. All categorical data was analyzed using frequencies and percentage. Associations between different categorical variables were assessed using Chi-square test and ANOVA test. A pvalue ≤ 0.05was considered statistically significant.

III. Results

Total 130 patients were enrolled for the study whounderwent ESWL for upper ureteric calculi. No patient left the study in between. The male: female ratio was 1:1.2 (M = 58, F = 72).

The mean age of the patients was 39.1 years. More than 80% of the patients were in the age group of 21–50 years. Table I shows the patient and stone characteristics.

The stone size ranged from 5 to 20 mm. Out of 130 cases, 70 had calculus in right ureter (53.8%) while the remaining 60 had calculus in the left ureter (46.2%). The maximum number of calculi ranged between 11 and 15 mm (61.4%).

Table II shows the number of cases as per the different sizes of the ureteric calculi in the present study as well as their laterality.

The mean number of ESWL sessions required to break the stones varied with the size of the ureteric calculi. For stones of size 5 to 10mm, the mean number of sessions received was 1.2 while stones of 11 to 15mm sessions were 1.97 and stones of 16 to 20mm received 2.33 mean sessions of ESWL.

The results of our study are shown in Table III. The success rate is depicted based on the imaging findings at 3 months.

The overall success rate was 94.6%. There were 7 (5.38%) cases in which even after five sessions, there was minimal to nil stone fragmentation. Hence, such cases were not subjected to further ESWL. Overall, the failure rate was 5.38% (n = 7). Five of the failure patient underwent URSL (Ureteroscopic Lithotripsy), 1 patient each underwent open ureterolithotomy and PCNL (Percutaneous Nephrolithotomy). The mean number of sessions increased as the stone size increased while the success rate decreased with increasing stone size. Among the complications encountered, the most common was that of haematuria (73%) followed by steinstrasse (16.9%). The complications encountered are presented below in Table IV. Haematuria was transient, mild and subsided within 2–3 days with the helpof oral tranexamic acid thrice a day for 3 days and adequate bed restand fluid intake. The incidence of steinstrasse was highest in the group with stone size >15 mm (55.5%). Fifteen (68.2%) of the patients were symptomatic, having features like flank pain, fever and nausea. The remaining cases were diagnosed incidentally on the follow-up X-ray KUB. All of the patients were initially treated by conservative management using adequate hydration, tamsulosin (0.4 mg HS) and analgesic on demand for a maximum of 2 weeks. If even after this period there was minimal or no stone clearance, they were taken up for URSL (ureteroscopic lithotripsy). Thirteen (59.1%) of the steinstrasse cases were managed conservatively whereas the remaining nine (40.9%) underwent URSLfor clearance. None of the patients had undergone open ureterolithotomy. Three (2.3%) patients developed perirenal haematoma after the fifth session which subsided in a period of 3 months with conservative management. Fourteen (10.7%) patients developed skin bruise which subsided with conservative treatment.

IV. Discussion

The modalities of treatment for upper ureteric calculi are multiple ranging from spontaneous clearance of ureteric calculi ± medical expulsion therapy to ESWL, URSL and even ureterolithotomy. Among these ESWL is considered as non-invasive, effective and convenient way of treating ureteric calculi with good success rates. In the study by Chaussey et al reported a 95% stone -free rate for the upper ureteric calculi treatedwithout any prior manipulation using a Dornier HM3lithotripter [9].

In our study, the overall success rate was 94.6% which is comparable to other published data [5-7].

The American Ureteral Stones Clinical Guidelines Panel reported that for upper ureteric calculi, the success rate of ESWL was 87% for <10 mm stone and 76% for >10 mm calculi [10]. In our study, as the stone size increases the success rate decreases. The success rate was 97.67% in <10 mm stone, 94.8 % when stone size was between 11- 15mm and 77.7 % when stone size was between 16- 20 mm.

Literature showed that causes of ESWL failure were inability to fragment or localize the stones; failure to clear the fragments may be due to anatomical obstruction of the urinary tract. In addition, the authors also evaluated variables such as types of lithotripters, number of ESWL sessions and shocks, and calculus composition [11].

In our study none of the patient was stented. Studies have not revealed any advantage of pushing upperureteral stones back to the renal pelvis prior to ESWL. If the stone can be well localized, it should be treated in situ [10]. Pushback technique for ureteral manipulation is associated with perforation rate of 5.1% [12].

The complication rate increases with high number of shock waves, higher energy levels, andafter multiple sessions [10]. In our study, as size of stone increases the number of sessions also increases and that is why steinstrasse is highest (55.5 %) when stone size > 15mm.

According to 2007 AUA guidelines, both ESWL and URSL are acceptable first line treatments for proximal ureteral calculi but URSL is associated with higher complications [13].

ESWL is not complication free despite its relatively non-invasive nature. The most common complication encountered in our study was haematuria (73%), which was mostly mild and transient and treated conservatively. Another common complication was that of steinstrasse which was seen in 16.9% of our cases (n= 22). Interestingly, its incidence was more common in patients with stone size >15mm. Goyal et al reported incidence of steinstrasse increases as size of the stone increases [14]. Steinstrasse was associated with pain, fever in 68.2% of patients and URSL was done in 40.9% of our patients (n = 9).Other patients of steinstrasse were managed conservatively.

V. Conclusion

For the management of upper ureteric stone, ESWL is a good option among different modalities of treatment including URSL. ESWL is non-invasive with greater stone clearance and less complications. The results of our study showed ESWL as a primary modality for upper ureteric stones of size ≤ 20mm with an overall success rate of 94.6%. With availability of newer machines,ESWL can be done without anaesthesia as an outpatient procedure.

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References

[1]. Denstedt J, Clayman RV. Electro hydraulic lithotripsy of renaland ureteral calculi. J Urol. 1990;143:13.
[2]. Matsuoka K, Iida S, Nakanami M, Koga H, Shimada A, MiharaT, Noda S. Holmium: yttrium-aluminum-garnet laser for endoscopiclithotripsy. Urology 1995;45:947.
[3]. Scarpa RM, Delisa A, Porru D, Usai E. Holmium: YAG laserureterolithotripsy. Eur Urol. 1999;35:233.
[4]. Chaussy C, Schmiedt E, Jocham D, Brendel W, Forssmann B, Walther V. First clinical experience with extracorporeally induced destruction of kidney stones by shock waves. J Urol. 1982;127:412.
[5]. Padhye AS, Yadav PB, Mahajan PM, Bhave AA, Kshirsagar YB, Sovani YB et al. Shock wave lithotripsy as a primary modality for treating upper ureteric stones: A 10-year experience Indian J Urol. 2008; 24:486–9.
[6]. Mogensen P, Anderson JT. Primary *in situ* extracorporeal shock wave lithotripsy for Ureteral calculi. Scand J UrolNephrol Suppl. 1994;157:159–63.
[7]. Gnanapragasam VJ, Ramsden PD, Murthy , Thomas DJ. Primary *in situ* extracorporeal shock wave lithotripsy in management of ureteric calculi: Results with a third generation lithotripter. BJU Int. 1999;84:770–4.
[8]. Fetner CD, Preminger GM, Seger J, Lea TA. Treatment of ureteric calculi by extracorporeal shock wave lithotripsy at multi-user center. J Urol. 1988;139:1192–4.
[9]. Chaussy C, Schmiedt E. Extracorporeal shock wave lithotripsy(ESWL) for kidney stones: an alternative to surgery? UrolRadiol1984;6:80-7.
[10]. Segura JW, Preminger GM, Assimos DG, Dretler SP, Kahn RI, Lingeman JE, et al. Ureteral Stones Clinical Guidelines Panel summary report on management of Ureteral calculi. J Urol. 1997;158:1915–21.
[11]. Grasso M, Loisides P, Beaghler M, Bagley D: The case for primary endoscopic management of upper urinary tract calculi: a critical review of 121 extracorporeal shock-wave lithotripsy failures. Urol 1995;45:363-71.
[12]. Rauchenwald M, Colomco T, Petritsch PH, Vilits P, Hubmer G. *In situ* extracorporeal shock wave lithotripsyof Ureteral calculi with the MPL 9000 lithotripter. J Urol. 1992;148:1097–101.
[13]. Preminger GM, Tiselius HG, Assimos DG, Alken P, Buck AC, Gallucci M, Knoll T, Lingeman JE, Nakada SY, Pearle MS, Sarica K, Türk C, Wolf JS Jr; American Urological Association Education and Research, Inc; European Association of Urology. 2007 Guideline for the management of ureteral calculi.Eur Urol. 2007;52:1610-31.
[14]. Goyal R, Dubey D, Khurana N, Anil Mandhani, Ansari MS, AneeshSrivastava, et al. Does the type of steinstrasse predict the outcome ofexpectant therapy? Indian Journal of Urology 2006;22:135–8.

Table IPatient and stone characteristics.

Number of patients	**130**
Male:female	1 : 1.2
Male	58 (44.61%)
Female	72 (55.38%)
Age group	10-80 Years
Laterality	
Right	70 (53.8%)
Left	60 (46.15%)
Stone size	5-20 mm

Table II Size and laterality of stones.

Stone Size (mm)	**Total No. of cases**		**Total No. of Cases (%)**
	Right Kidney	Left Kidney	
5-10	24	19	43 (33.1)
11-15	41	37	78 (60)
16-20	06	03	9 (6.9)

Table III Success of ESWL in upper ureteric calculi.

Stone size (mm)	**No. of Cases**	**No. of sessions (mean ± SD)**	**Stone free patients(including clinically insignificant fragments)**	**Non stone free patients**	**Overall success rate (%)**	**ANOVA p value**
5-10	43	1.22 ± 0.515	42	01	97.67	0.031
11-15	78	1.97 ± 1.01	74	04	94.8	
16-20	09	2.33 ± 1.21	07	02	77.7	

Table IV Complications of ESWL.

Complication	**Total no. of cases (%)**
1.Hematuria	95 (73)
2. Steinstrasse	22 (16.9)
(a)*Stone size*	
5-10mm	2/43 (4.6)
11-15mm	15/78 (19.6)
16-20mm	5/9 (55.5)
(b)*Presentation*	
Symptomatic	15/22 (68.2)
Incidental	7/22 (31.8)
(c)*Management*	
Conservative	13/22 (59.1)
URSL	9/22 (40.9)
3.Skin Bruise	14 (10.7)
4.Perirenal hematoma	3 (2.3)