INSITU ESWL FOR URETERIC CALCULI

MUHAMMAD IMTIAZ BAIG*, AZIZ ABDULLAH**
*Assistant Professor of Urology, Baqai Medical University, Karachi**
*Head of Department Urology, Liaquat National Hospital, Karachi***

ABSTRACT
Objective: *To assess the efficacy of in situ ESWL in the management of ureteric calculi.*
Study Design: *Prospective interventional quasi experimental study.*
Setting & Duration: *Liaquat University of Medical and Health Sciences, Jamshoro and Liaquat National Hospital, Karachi from May 2000 to October 2001.*
Patients: *Fifty three adult male and female patients with solitary, unilateral upper, mid-or lower ureteric calculi undergoing ESWL.*
Methodology: *All the patients were evaluated with routine investigations,including PT and APTT and IVP. Hypertensive patients were asked to get their blood pressure controlled before subjecting them to in situ ESWL. All patients with upper and mid-ureteric calculi were treated in supine positon, while those with lower ureteric calculi in prone position. All the patients were given laxatives the night before the procedure to eliminate the gases for proper stone localization and focusing by fluoroscopy. The lithotripter used was Piezoceramic type, having both ultrasound and fluoroscopy facilities for stone focusing, Fluoroscopy was used for stone focusing in this study. The shockwaves were given for sixty five minutesThe blood pressure of all patients were checked after the procedure and discharged after one hour when they had voided once and there was no complain of hematuria. The stone fragmentation was directly visualized and stone clearance was checked in outpatient by plain X-ray KUB one week after lithotripsy.*
Results: *Significant effect of stone site and number of visits were observed, while other epidemiological factors like age, sex and stone size showed a non-significant effect on result. The success rate was 49 (92.5%) cases out of 53 cases.*
Conclusion: *ESWL is an effective treatment modality for ureteric calculi as well as advantageous over other treatment modalities. It should be the first line treatment for solitary, unobstructed, unilateral ureteric calculi less than or equal to 1.0cm in size.*

KEY WORDS: *ESWL, Ureteric Calculi, Efficacy*

INTRODUCTION

The urinary stones,and especially ureteric stones,are amongst the most painful afflictions of Mankind[1], and constitute a significant proportion of the workload of urologist. Until the last quarter of the previous century, open surgery remained the only option for treating ureteric stones. Drastic changes have taken place in the management of ureteric calculi in the last two decades.In present time, majority of patients with ureteric stones can be managed without open surgery, either by ESWL, or by endoscopic methods. In this study, ESWL was used to treat ureteric calculi. ESWL is non-invasive, do not require anaesthesia, and is done in an out-patient setting with occasional analgesia, and has no significant complications.

Correspondence:
Dr. Mohammad Imtiaz Baig
15/4 Hoor Mansion, CA21-22, Chandni Chowk,
Stadium Road, Bhadurabad,Karachi.
Phones: 021-4129434, 0301-3333178.
E-mail: urosurgimtiaz@yahoo.com

METHODOLOGY

This is an interventional quasi experimental study of over one year from May 2000 to October 2001 conducted on 53 patients at Liaquat University of Medical and Health Sciences Jamshoro and Liaquat National Hospital, Karachi. Included in this study were adult males and females with solitary, unilateral, un-obstructed ureteric calculi, while children, pregnant females, and those with obstructed calculi were excluded. Apart from clinical workup, all patients were evaluated with CBC, urine

analysis and culture and sensitivity, PT, APTT and IVU.

After evaluation,all patients were asked to take laxative overnight to eliminate gases for proper localization of stone by fluoroscopy, and asked to come empty stomach. Any patient with UTI was treated before subjecting them to in situ ESWL. No sedation or analgesia was used, but few patients did complain of pain during the procedure and were given intramuscular diclofenic sodium. The procedure was carried out on outpatient basis. The lithotripter used was Piezoelectric, in which shockwaves are generated by a mosaic of piezoceremic crystals covering a water-filled dish in which the loin of patient is submerged. Stone localization was done by fluoroscopy. Initially the rate of shockwave delivery was 2Hz and then gradually increased to 8Hz through 4Hz. Firing rate of 4Hz and 8Hz was used,and total energy delivered during one session was 80. All the patients tolerated the procedure well with few requiring analgesia during the procedure. Intermittent monitoring with fluoroscopy for stone position and fragmentation was done. The position of patient for upper ureteric stone was supine, while for mid-and-lower ureteric stones it was prone[8] to prevent interposition of pelvic bones against shock waves.

The success rate of stone fragmentation for ureteric calculi was 92.5% (49 out of 53 patients), while failure was observed in 7.5% (4 out of 53 patients). In 20 patients only one session was required to fragment the stone, while 18 patients required two sessions and 11 patients required 3 sessions, and these 11 patients were those who had midureteric calculi. After the ESWL session, all patients were advised high fluid intake, increased mobility, oral analgesic (diclofenic) as required, and appropriate oral antibiotic for a week. The clearance of stone fragments was confirmed by plain X-ray KUB on 8th post-ESWL day.

RESULTS

During the study, 53 patients, 39 males (73.6%) and 14 females (26.4%), with male to female ratio of 2:1, under went ESWL. Their mean age was 41years (range was 18 to 65 years). The stone size ranged from 0.5 to 1.0cm along their long axis with mean size of 0.7cm. Out of 53 patients, 33 belonged to rural areas, while remainder belonged to urban areas. The incidence of site is as shown in the Table I.

The mean period of shockwave delivery was 52.5 (range was 45 to 60 minutes). Out of 53 patients, three complained of moderate to severe pain during ESWL and procedure was abandoned. Their stones were later fragmented by ureteroscopy with lithoclast. Seven patients complained of mild hematuria post- ESWL that continued for 3-4 days and subsided spontaneously. They all were evaluated by ultrasound for any perirenal hematoma and none was found. Twenty five patients complained of paraesthesiae in legs and these were those who required 2-3 sessions of ESWL. Besides these, no other significant complaint was reported by any patient. All the patients were advised high oral fluid intake, increased mobility, oral analgesia (diclofenic sodium), oral broad-spectrum antibiotic accorrding to culture and sensitivity report, and were also advised to urinate in a bottle for 24 hours post-ESWL to retrieve sand results of analysis. The follow-up, the patient were advised to get urinan-alysis and plain X-ray KUB done one week after ESWL to see clearance of stone fragments. Twenty four patients still had the fragments which were not causing pain or obstruction. They were given another week of watchful waiting for spontaneous fragment clearance, with an advise to increase fluid intake and mobility. The fragments cleared spontaneously in 17 patients, while fragments were removed endoscopically in seven patients. There was significant effect of stone site and number of sessions,while other epidemiological factors like age, sex and stone size showed a non-significant effect on result.[11]

DISCUSSION

Urinary calculi is very common in our country. The common causes in our setup includes malnutrition, hot climate, dehydration, poor accessibility to healthcare and non-availability of clean drinking water. Ureteric calculi are symptomatic, most common symptoms being ureteric colic and site of pain may vary from loin pain to lower abdominal pain with radiation to groin and tip of penis(in males). Depending on site and size of ureteric calculi, and availability of treatment modalities, various approaches, invasive,minimally invasive, and non-invasive,are being practiced. These include[1] ureterolithotomy (invasive)[2], ureteroscopy with intracor-

Table I. Frequency of stone site

Site	No. of Patients
Right upper ureteric calculi	20
Right midureteric calculi	4
Right lower ureteric calculi	10
Left upper ureteric calculi	11
Left midureteric calculi	4
Left lower ureteric calculi	4
Total	53

poreal lithotripsy, and laparoscopic ureterolithotomy (both minimally invasive)[3,5] extracorporeal shockwave lithotripsy(ESWL).

In situ ESWL for ureteric calculi is a non-invasive treatment modality and very effective. ESWL has been established as an standard and preferred treatment modality for majority of renal and ureteric calculi since the time it was introduced in 1982.[2,3] Depending on mode of generation of shockwaves, ESWL can be elecrohydraulic,electromagnetic, and piezoelectric.[9] There have been studies showing one type of lithotripter more superior than other in fragmentation of ureteric calculi, but standardization is yet to be established.

Our study does not differ significantly from other studies carried out worldwide.[5,6] The difference is seen in the number of sessions given and stone fragmentation achieved. This is because of type of lithotripter used, whether electrohydraulic, electromagnetic or piezo-electric. The complications like mild hematuria, pain during passage of gravel, and paraesthsiae of legs have been reported.[7] One other complication reported was Steinstrasse, meaning stone street. In this, stone fragments line up along the ureter following in situ ESWL, and fail to clear without intervention. This complication is commonly seen in large renal calculi and calculi in upper third of ureter. To prevent this complication, double J stenting is done prior to in situ ESWL. Fortunately in our study, this complication did not occur, nor prior ureteric stenting was done in any case.

At present, intracorporeal lithotripsy and laparoscopic ureterolithotomy are the favoured treatment modalities for ureteric calculi,but both are invasive, although minimally. In situ ESWL is truly non-invasive mostly and more than 90% successful.

CONCLUSION

ESWL is a safe, very effective and above all, non-invasive treatment modality for ureteric calculi. The complications are mild and easily manageable conservatively. The limitations include obstruction distal to stone, impacted stone,and females of childbearing age with distal ureteric calculi. These have to be overcome to make ESWL as the primary, safe, and completely effective treatment modality.

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