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Research Article

**STUDY TO DETERMINE THE EFFICACY OF IN SITU
EXTRACORPOREAL SHOCKWAVE LITHOTRIPSY FOR
URETERAL STONES**¹Dr Talha Hassan Shah, ²Dr Muhammad Usman, ³Dr Bilal Khan¹Allama Iqbal Medical College, Lahore²Wah Medical College, Wah Cantt³Allama Iqbal Medical College, Lahore

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Abstract:***Aim:** To evaluate the effectiveness of in situ ESWL for the treatment of ureteral stones.****Study design:** Prospective interventional quasi experimental study.****Place and duration:** In the Department of Urology, Jinnah Hospital Lahore for one year duration from March 2019 to March 2020.****Methodology:** 53 adult men and women with single, upper, middle or lower ureteric calculi undergoing ESWL were selected.**All patients were assessed by routine testing, including PT, APTT and IVP. Hypertensive patients were asked to monitor their blood pressure before sending them to in situ ESWL. All patients with upper and mid-ureteric calculi were treated in supine position and patients with lower ureter stones were treated in prone position. All patients were given a laxative the night before surgery to eliminate gases for the correct location of stones and focusing by fluoroscopy. A piezoceramic type lithotripter was used, having both ultrasound and fluoroscopy for focusing the stone, in this study was used. Shock waves were given for sixty-five minutes. Blood pressure in all patients was checked after surgery and unloaded after one hour, when they subsided and you could not complain about hematuria. Stone fragmentation was visualized directly, and stone clearance was checked on an outpatient basis by a simple KUB x-ray one week after lithotripsy.****Results:** Significant influence of stone site and number of visits was observed, while other epidemiological factors such as age, gender and stone size showed negligible effect on the result. The success rate was 49 (92.5%) of 53 cases.****Conclusion:** ESWL is an effective method of treating ureter stones, as well as being more beneficial compared to other treatments. This should be the first-line treatment for a single, undisturbed, unilateral, ureteral stone less than or equal to 1.0 cm.****KEYWORDS:** ESWL, ureter calculations, activity***Corresponding author:****Dr. Talha Hassan Shah,**

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INTRODUCTION:

Urinary stones, especially ureters, are one of the most painful aspects of humanity and constitute an important part of the work of a urologist. Until the last quarter of the last century, the only option for treating ureter stones was open surgery. There have been major changes in the treatment of ureter stones over the past twenty years. Currently, most patients with ureteral stones can be treated with ESWL or endoscopic methods without open surgery. In this study, ESWL was used to treat ureteral stones. ESWL is not invasive, does not require anesthesia and is rarely outpatient with analgesia and has no significant complications.

METHOD:

This is an interventional quasi-experimental study conducted on 53 patients. The study included adult men and women with single, unilateral, non-obstructive ureteric stones, while children, pregnant women and women with obstructed stones were excluded. In addition to the clinical trial, all patients were evaluated using CBC, urine analysis and culture and sensitivity, PT, APTT and IVU.

After evaluation, all patients were asked to take laxatives overnight to eliminate gases for proper stone localization by fluoroscopy and were asked to come on an empty stomach. Each UTI patient was treated prior to ESWL in situ. Sedation or anesthesia were not used, but few patients complained of pain during the procedure and diclofenac sodium was administered intramuscularly. The procedure was carried out on an outpatient basis. The lithotripter used was piezoelectric, in which shock waves are generated by a mosaic of piezoceramic crystals covering a water-filled vessel in which the patient's storage compartment is immersed. The location of the stone was done by fluoroscopy. Initially, the shock

wave delivery rate was 2 Hz, and then gradually increased to 8 Hz to 4 Hz. A firing frequency of 4 Hz and 8 Hz was used, and the total energy supplied during one session was 80. All patients tolerated the procedure well, and few required anesthesia during the procedure. Interrupted fluoroscopy monitoring of stone position and fragmentation was performed. The position of the patient in the case of the upper ureter stones was supine, while for the stones in the middle and lower ureters was prone to prevent the interaction of the pelvic bones with shock waves.

The rate of stone fragmentation efficiency in ureterolithiasis 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 needed for stone fragmentation, while 18 patients required two sessions, and 11 patients required 3 sessions, and these 11 patients were those who had interstitial stone. After the ESWL session, all patients were recommended high fluid intake, increased mobility, an oral analgesic (diclofen) as required, and an appropriate oral antibiotic for a week. Removal of stone fragments was confirmed by ordinary KUB X-ray 8 days after ESWL.

RESULTS:

During the study 39 men (73.6%) and 14 women (26.4%) ESWL was used in 53 patients with a male to female ratio of 2: 1. Their average age was 41 years (range 18 to 65 years). The size of the stone ranged from 0.5 to 1.0 cm, with an average size of 0.7 cm. Of the 53 patients, 33 belong to rural areas and the rest to urban areas. The frequency of this area is shown in Table I.

The average shockwave transmission time was 52.5 (range 45-60 minutes). Three of 53 patients complained of moderate to severe pain during ESWL and the procedure was stopped.

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

The stones were later broken by lithoclast ureteroscopy. Seven patients had mild hematuria, which lasted for 3-4 days and treated spontaneously. It was assessed by ultrasound to detect all peri-renal hematoma and none was found. Twenty-five patients complained of paresthesia in the legs and these patients required 2-3 ESWL sessions. In addition, no other patient had reported any other relevant complaints. All patients were offered broad-spectrum oral antibiotics in line with high oral fluid intake, increased mobility, oral analgesia (diclofenac sodium), culture and sensitivity report, and urine analysis for 24 hours. During follow-up, the patient was offered a urine test and a simple KUB x-ray one week after ESWL to see stone removal. Twenty-four patients still had fragments that did not cause pain or obstruction. With the recommendation to increase fluid intake and mobility, they waited another week in which they spontaneously removed. They were given another week of vigilant waiting for spontaneous fragment removal, with a recommendation to increase fluid intake and mobility. Fragments disappeared spontaneously in 17 patients, while fragments were removed endo-scopically in seven patients. The location of the stone and the number of sessions had a significant impact, while other epidemiological factors such as age, sex and size of the stone showed little effect on the result

DISCUSSION:

Urinary stones are very common in our country. The most common causes in our configuration are malnutrition, hot climate, dehydration, poor access to health care and a lack of clean drinking water. Ureteral stones are symptomatic, the most common symptoms are ureteral colic, and the site of pain may differ from lumbar pain to lower abdominal pain with radiation to the groin and tip of the penis (in men). Depending on the location and size of the ureter stone and the availability of treatment methods, different approaches are practiced, invasive, minimally invasive and non-invasive. These include ureterolithotomy (invasive) ureteroscopy with intra-systemic lithotripsy and laparoscopic ureterolithotomy (both minimally invasive) extracorporeal shock wave lithotripsy (ESWL).

ESWL in situ for ureteral stone is a non-invasive treatment method and very effective. ESWL was established as the standard and preferred treatment method for most kidney stones and ureters since its introduction in 1982.2.3 Depending on the mode of shock wave generation, ESWL can be electrohydraulic, electromagnetic and piezoelectric.9 There have been studies showing that one type lithotripter is better than others in ureteral stone fragmentation, but standardization

has not yet been established.

Our study is not significantly different from other studies conducted around the world. The difference can be seen in the number of sessions and stone fragmentation achieved. This is due to the type of lithotripter used, both electrohydraulic, electromagnetic and piezoelectric. Complications such as mild haematuria, pain during gravel passage and leg paresthesia have been reported. Steinstrasse, a stone street, was another reported complication. In this case, stone fragments position themselves along the ureter after ESWL in situ and do not remove without intervention. This complication is commonly seen in large kidney stones and stones in the upper third of the ureter. To prevent this complication, double J stenting is performed before ESWL in situ. Fortunately, this complication did not occur in our study, nor ureteral stenting was performed before.

At present, intra-systemic lithotripsy and laparoscopic ureterolithotomy are the preferred methods for treating ureter stones, but both are invasive, although minimal. In situ, ESWL is really non-invasive and over 90% successful.

CONCLUSION:

ESWL is a safe, highly effective and, above all, non-invasive method of treating ureter stones. Complications are mild and easy for conservative treatment. Restrictions include distal stone obstruction, women with the potential for reproduction with affected stone, and further urethral stones. In order for ESWL to be the basic, safe and fully effective treatment method, it must be overcome.

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