Shock Wave Lithotripsy for Medium to Large Renal Pelvic Stone Without Ureteral Stent

Ammar Fadel Abid

ABSTRACT:

BACKGROUND:

Although Double J ureteral stent placement has been widely used to prevent steinstrasse after fragmentation of larger stones. But, particularly more recently, its preventive efficacy has been questioned.

OBJECTIVE:

It is to determine that patients with medium to large renal pelvic stone should be treated in situ shock wave lithotripsy without auxiliary stenting.

PATIENTS & METHODS:

Between October 2007 and December 2008 a series of 55 patients with unilateral renal pelvic stone with at least one diameter between 15 and 30mm. were treated with extracorporeal shock wave lithotripsy in situ without auxiliary stenting.

RESULT:

Fifty five patients the mean age 40 years, 21 being males and 34 were females.

With renal pelvic stone, clearance of stone fragments was analyzed by x-ray KUB and ultrasound on first month and three months after treatment or until stone fragments were cleared. Twenty three 42 % were stone free three months after treatment while 32 patients 58% were having residual fragments. Treatment complications consisted of steinstrasse in seven 12.7%, pyelonephritis in two, four of steinstrasse cleared spontaneously, the other three steinstrasse were treated successfully with ESWL.

CONCLUSION:

Shock wave lithotripsy in situ for medium to large renal pelvic calculi (15 to 30 mm) is reasonable procedure, avoiding the morbidity of ureteral stent and additional cost.

***KEY WORDS*:** renal stone, extracorporeal shock wave lithotripsy, ureteral stent

INTRODUCTION:

Extracorporeal shock wave lithotripsy (ESWL) is an essential treatment for urinary calculi, but post-ESWL steinstrasse (SS) is a potential complication, especially in large-burden calculi. [1] Double J ureteral stent DJS placement has been widely used to prevent SS after fragmentation of larger stones. However, particularly more recently, its preventive efficacy has been questioned. [2, 3, 4, 5]

In fact, DJS may make treatment more uncomfortable for the patients than performing lithotripsy without ureteral stenting and do not improve stone passage markedly [2, 6, 7, 8].

Therefore, the aim of this study was to determine that patients with medium to large renal pelvic stone can be treated in situ ESWL without auxiliary stenting.

Department of Urologic Al-Yarmouk Teaching Hospital Al- Mustancirya Medical College

PATIENTS AND METHODS:

A series of 55 patients with unilateral renal pelvic stone with at least one diameter between 15 and 30mm. were eligible for the study. Elective ESWL done in Al-Yarmouk lithotripsy center between October 2007 and December 2008.

Pre-procedural evaluation included urine culture and serum creatinine. Stone localization and size were assessed by x-ray KUB and ultrasound scanning or intravenous urography IVU. KUB was taken routinely to evaluate radio-opacity and stone size [9]. Assessment of stone burden by measuring the length and width is far from accurate so approximate stone surface area (mm^2) can be extracted from the length and width on KUB. [10] .

On day of lithotripsy patients were given I.M injection of analgesia (tramadol 100mg) half hour before lithotripsy session and intravenous tramal given to those who developed sever pain during session.

All patients were treated on electromagnetic Siemens lithotripter, as outpatients. Each treatment session consisted of 2,500 to 3,000 shock waves; total shock waves as maximum range (5000-12000) were given over two to four sessions. Power of disintegration was ranged from 1-20 KV and shock waves were given at a frequency of 90 shocks per minute.

To avoid overwhelming the ureter with big fragments the power of shock waves increased gradually and the center part of pelvic stone was disintegrated first. [11].

A subsequent treatment session was scheduled only after the majority of fragments from a previous session had passed.

After initial ESWL, all patients received chemolytic therapy and analgesics for 3-5 days. They were instructed to filter the urine. All patients with SS were given alpha blocker to enhance ureteral stone expulsion. [12] Success is defined as absence of stone three months after treatment.

Clearance of stone fragments was analyzed by KUB and ultrasound on first month and three months after treatment or until stone fragments were cleared.

RESULTS:

Fifty five patients with unilateral renal pelvic stone, at least one diameter between 15and 30mm with renal pelvic stone. [Figure 1, 2, 3] Thirty one of 55 stone burden more than 200 mm² while 24 their stone burden less than 200mm². Forty nine patients were their stones opaque while six patients were their stones radiolucent. Patients' demographic characteristic including age, sex, and stone size are shown in table 1. The mean age was 40 years range (16-70), 21 being males and 34 were females.

Table1:Demographic and baseline characteristics of 55 patientsVariable

Mean ± SD age, yr	40 ± 13
Sex (n) Male Female	 21 34
Right versus left	30\25
Mean stone surface area (mm²)	233 (mm²) ± 82
Mean ± SD stone length	20.7 mm ± 4
Mean ± SD stone width	14.6 mm ± 4.3

Twenty three of 55 patients 42 % were stone free three months after treatment while 32 patients 58% were having residual fragments.

Treatment complications consisted of steinstrasse in seven 12.7%, pyelonephritis in two. The SS was resolved spontaneously in four however; three patients were treated with ESWL. ESWL was aimed at disintegration of the leading fragment and mechanically loosening the small fragments above it. The steinstrasse was in the lower third of the ureter in three of 7 patients.

Severe pains during SWL session occured in three of 55 as their stones close to the ribs necessitate giving them additional intravenous analgesia.

Twenty eight patients 50.9 % have hydronephrosis ranging from mild to severe 26 patients were mild to moderate while two with severe hydronephrosis on IVU and U\S. all cases of SS occur in patients with hydronephrosis.

Patients were followed by KUB and ultrasound on first month and three months after ESWL, we noticed that initial radiopaque stones were no more seen on KUB but still detected on ultrasound imaging.

DISCUSSION:

The use of ureteral DJS prior to extracorporeal shock wave lithotripsy is controversial. [2] Sulaiman et al. found that the incidence of steinstrasse was 6.3% [3].

Our study has focused on complications (e.g. steinstrasse, pyelonephritis) and stone free rate after extracorporeal shock wave lithotripsy in unstented patients.

In comparative studies in which pretreatment stenting is used like Bierkens [7] and kirkali [2] They found that stone-free rate in the stented group was not significantly different from the non stented group. Bierkiens et al who studied 41patients with large renal calculi. Complications consisted of steinstrasse

in 6, pyelonephritis in one, and bladder discomfort in almost half of patients. While our result of 55 patients without stents the complications rate consisted of SS in 7, Pyelonephritis in two but, in our study we included midsize stone in addition to large stone.

Placing a ureteric stent before ESWL does not prevent steinstrasse, but prevents its complications. Medium to large stones are supposed to produce larger fragments if treated at higher KV, so the primary aim should be to pulverize the stone than to fragment it by avoiding high power during ESWL session and this lead to better outcome and less chance of SS. [14, 15]

Moreover, the presence of DJS is thought to interfere with delivery of stone fragments. [8, 13]

Changes in stent design and materials show promise but, the ideal ureteral stent biomaterial has yet to be discovered and an area of promising development is the drug eluting stent to prevent infection and encrustation. [6]

Even the use of new spiral DJS on presumption that stone fragments clearance is faster than with standard DJS Gerber et al found no advantage in overall stone clearance compared with standard stents. [16]

The study confirms previous report [2, 3, 5, 6] that stenting is not mandatory for medium to large renal calculi before ESWL without increasing incidence of SS. also avoids stent related morbidity, such as pain, discomfort, bladder irritability, infection and encrustation. In addition, forgotten stents can lead to significant morbidity as result of severe encrustation. [6]

Finally we should stress on the point of gradual increasing the power of disintegration and targeting the center of stone these factors play role in decreasing the incidence of SS. In case of steinstrasse occurred ESWL is successful and should be the primary modality of treatment if expectant therapy failed.

CONCLUSION:

Shock wave lithotripsy in situ for medium to large renal pelvic calculi (15 to 30 mm) is reasonable procedure, avoiding the discomfort of ureteral stent and additional cost. Of course, in selected cases (solitary kidney) ureteral stenting has a useful adjunctive role in extracorporeal shock wave lithotripsy.

Fig.1: KUB. Left renal stone with multiple lower calyceal stones.

Fig.2: IVU. Left obstructive renal pelvic stone treated with ESWL without double J. stent.

Fig.3: KUB. of the same patient after clearance of stones.

REFERENCES:

1. Rabbani SM. Treatment of steinstrasse by transureteral lithotripsy. Urol J. 2008 ; 5 ,89-93.
2. Kirkali Z, Esen AA, Akan G. Place of double-Jstents in extracorporeal shock wave lithotripsy. EurUrol 1993; 23,460–462.
3. Suleiman MN, Buchhloz NP, Clark PB the role of ureteral stent placement in the prevention of steinstrasse. J Endourol 1999 ;13,151–155.
4. Rocco Damiano, Andrea Oliva, Ciro Esposito, Marco De Sio, Riccardo Autorino, Massimo D'Armiento. Early and Late Complications of Double Pigtail Ureteral Stent Urol Int 2002; 69,136-140.
5. Abdulla Ahmed Karama Musa. Use of double-J stents prior to extracorporeal shock wave lithotripsy is not beneficial: results of a prospective randomized study Int Urol Nephrol 2008; 40,19–22.
6. Haleblian G, Kijvikai K, de la Rosette J, Preminger G. Ureteral stenting and urinary stone management: a systematic review. J Urol. 2008; 179,424-30.
7. Bierkens AF, Hendrikx AJ, Lemmens WA, Debruyne FM. Extracorporeal shock wave lithotripsy for large renal calculi: the role of ureteral stents. A randomized trial. J Urol. 1991; 145,699-702.
8. Kato Y, Yamaguchi S, Hori J, Okuyama M, Kaneko S, Yachiku S Utility of ureteral stent for stone street after extracorporeal shock wave lithotripsy Hinyokika Kiyo. 2005; 51,309-14.
9. Lamb AD, Wines MD, Mousa S, Tolley DA. Plain radiography still is required in the planning of treatment for urolithiasis. J. Endourol. 2008; 22 ,2201-5.
10. H-G Tiselius, P. Alken, C. Buck et al: guidelines on urolithiassis, European association of urology guidelines update March 2008 edition, 127.
11. Pode, D., Verstandig, A., Shapiro, A., Katz, G. and Caine, M.: treatment of complete staghorn calculi by extracorporeal shock wave lithotripsy monotherapy with special reference to internal stenting. J. Urol.1988; 140,260.
12. Yilmaz E, Batislam E, Basar MM, Tuglu D, Ferhat M, Basar H.The comparison and efficacy of 3 different alpha1-adrenergic blockers for distal ureteral stones. J Urol. 2005; 173,2010-2.
13. Argyropoulos AN, Tolley DA. Ureteric stents compromise stone clearance after shockwave lithotripsy for ureteric stones: results of a matched-pair analysis. BJU Int. 2008 Aug 14. [Pub ahead of print]
14. Talic RF, Rabah DM Effect of modification of shock-wave delivery on stone fragmentation. Curr Opin Urol. 2006; 16,83-7.
15. Madbouly K, Sheir KZ, Elsobky E, Eraky I, Kenawy M. Risk factors for the formation of a steinstrasse after extracorporeal shock wave lithotripsy: A statistical model. J Urol 2002; 167,1239-42.
16. Gerber R, Nitz C, Studer UE, Danuser H, Spiral stent versus standard stent in patients with midsize renal stones treated with extracorporeal shock wave lithotripsy: which stent works better? A prospective randomized trial. J Urol. 2004; 172,965-6.