

IN SITU ESWL AND ESWL AFTER PUSH BACK FOR UPPER URETERIC CALCULI: A COMPARATIVE STUDY

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Abstract

This prospective study has been done to compare the results of treatment of uncomplicated upper ureteral calculi by in situ ESWL and ESWL after push back. Ninety consecutive patients with single upper-ureteric stones of < 1 cm in size with no distal obstruction were selected and divided into two groups. Fifty patients in group 1 were treated by in situ ESWL while 40 patients in group 2 were treated by push back followed by ESWL. In the in situ ESWL group, 56% cases were cleared of stone after 1 week of first session, 24% cases required second and 10% cases required third sessions for complete clearance of stone. Overall 90% clearance was achieved after 90 days in this group. In the ESWL after push back group, 52.5% cases were cleared of stone after 1 week of first session, 30% cases required second and 10% cases required third sessions for complete clearance of stone. Overall 92.5% clearance was achieved after 90 days in this group. Although more clearance rate was achieved in ESWL after push back, it was not statistically significant ($p > 0.05$). The number of average ESWL sessions required was 1.54 for stone < 1 cm and 1.77 for stone of 1 cm in the in situ ESWL group, whereas it was 1.46 and 1.48 respectively for stones < 1 cm and of 1 cm respectively in the ESWL after push back group, however this difference was not statistically significant. More shock wave and energy was needed in the in situ ESWL group than in ESWL after push back group. The mean shock wave was 1994 ± 449 for in situ ESWL group and 1757.5 ± 255 for 17S117, after push back group, which was statistically very significant ($p < 0.01$). The mean energy used was 5.07 ± 0.81 in the in situ ESWL group and 4.6 ± 0.48 in ESWL after push back group and this difference was also statistically significant ($p < 0.01$). Post procedure complications like loin pain, noninvasive nature of ESWL has a strong appeal to the patients and physicians, and has become the first line treatment option for proximal ureteral stones. Although some urologists claim a higher success rate of ESWL after push back procedure, the invasiveness of the additional ureteral manipulation must be considered⁶. On the other hand, in situ ESWL for uncomplicated upper ureteric calculi is appealing because it is noninvasive, requires no anesthesia, low

morbidity, low cost and can be performed as an outpatient therapy and offers acceptable results. So, this study has been done to compare the results of treatment of uncomplicated upper ureteral calculi by in situ ESWL and ESWL after push back.

Materials and Methods

This prospective study was done in the Department of Urology, Bangabandhu Sheikh Mujib Medical University from Jan 2009 to Dec 2009 after getting approval from the institutional review board. Ninety patients with single upper ureteric stones of < 1 cm in size with no distal obstruction were selected and divided into two groups. Stones located < 2 cm lateral to the spine, size > 1 cm in size, pregnant women and patients with bleeding disorders were excluded from the study. After taking the informed consent, 50 patients of group 1 were treated by in situ ESWL while 40 patients of group 2 were treated by push back followed by ESWL. In all cases, ESWL was done by Siemens Lithoskop (3rd generation) lithotripter.

All patients were thoroughly examined and routine investigations done. IVU was done in all patients to see the condition of kidneys, grade of hydronephrosis, location and size of stone. All patients were advised to take mild laxative and ultracarbon in the night before ESWL. All patients were nothing per oral from morning on the day of procedure and were given intravenous fluid & diclofenac suppository half hour prior to the procedure. Additional analgesia or sedation was given on demand basis. In patients of group 2, a pre-ESWL push back procedure was done under general anesthesia and fluoroscopic guidance. After dislodging the stone back into the kidney, a DJ stent was kept in situ and ESWL was done.

After ESWL, all patients were advised to follow up after 7 days with a plain X-ray of KUB region, and if necessary second & third session of ESWL were given at one week interval. If the stone fails to clear after third session, the patient was observed for 90 days to see stone clearance. Refractory cases were referred for other modalities of treatment. The data were analyzed using SPSS version 12. Student's t test and chi square test were used and p-value of < 0.05 was considered significant.

Results

The demographic and baseline characteristics of the patients are shown in table I.

Table-I

Demographic & baseline characteristics among the groups.

Characteristics	Group I (N= 50)	Group II (N= 40)
Mean age t SD	34.86+11.74	35.12+14.48
Range (years)	17-62	16-62
Sex distribution		
Male	32(64%)	30(75%)
Female	18 (36%)	10(25%)
Involved ureter		
Left	35 (70%)	30(75%)
Right	15 (30%)	10(25%)
Size of stone		
<1 cm	28 (56%)	15 (37.5%)
1 cm	22(44%)	25 (62.5%)

The outcome variables were stone clearance rates (table 11), ESWL sessions required, shock wave & energy required, post procedure complications and hospital stay (table-II).

Table-II

Stone clearance rates between the groups.

Stone clearance rates	Group I (in situ)	Group II (push back)	p-value
Clearance after 1st session			
< 1 cm	18(36%)	8(20%)	> 0.05°
1 cm	10(20%)	13 (32.5%)	
Clearance after 2nd session			
<1 cm	5 (10%)	5 (12.5%)	> 0.05"
1 cm	7(14%)	7 (17.5%)	
Clearance after 3 rd session			
< 1 cm)	3 (6%)	2(5%)	> 0.05"
1 cm	2(4%)	2(5%)	
Overall clearance after 90 days			
< 1 cm)	26(92.86%)	15(100%)	> 0.05"
1 cm	19(86.36%)	22 (88%)	

" χ^2 " test was not significant

Table-III

Number of ESWL sessions, shock wave & energy required, complication & hospital stay between the groups.

Variables	Group I (in situ)	Group 2 (push back)	p-value
Avg. ESWL sessions required (n)			
< 1 cm	1.54	1.46	> 0.05n
1 cm	1.77	1.48	
Shock waves required (n)			
Mean \pm SD	1994 \pm 449	1757 \pm 255	< 0.01
Range	1500-5000	1000-2000	
Energy required (KV)			
Mean \pm SD	5.07 \pm 0.81	4.63 \pm 0.48	<0.01*
Range	4-8	4-6	
Complications (n)			
LOTS	12(24%)	28(70%)	<0.00P
Loin pain	20(40%)	25(62.5%)	<0.0V
Fever	5 (10%)	12(30%)	<0.0V
Hematuria	15 (30%)	28(70%)	<0.001"
Hospital stay (days)			
Mean \pm SD	1.06 \pm 0.24	2.4 \pm 0.74	<0.001
Range	1-2	2-5	

" χ^2 test was not significant; * t test was significant, " x test was significant

Discussion

In the in situ ESWL group, 28 (56%) cases were cleared of stone after 1 week of first session, among which 18 (36%) were <1 cm in size and 10 (20%) were 1 cm in size. However, the higher clearance rate of the smaller stones was not statistically significant. It was also observed that 12 (24%) cases required second and 5 (10%) cases required third sessions for complete clearance of stone. Overall clearance was achieved in 45 (90%) cases after 90 days in this group. These findings are similar to those by El-Gammal et al. (1992) who reported 94.8% clearance rate for upper ureteric stones treated by EWSL in situ with 66.7% patient stone free after first session, 17.7% needed two sessions and 8.5% required three sessions'. Similarly, Shameen et al. (2001) also reported good results with 96.6% stone free rates in a study. on 118 patients of ureteral stones of mean 11.1 mm in size treated with in situ ESWL using Lithostar plus lithotripter⁸.

In the ESWL after push back group, 21 (52.5%) cases were cleared of stone after 1 week of first session, among which 8 (20%) were <1 cm in size and 13 (32.5%) were 1 cm in size. However, the higher clearance rate of the larger stones was not statistically significant. It was also observed that 12 (30%) cases required second and 4 (10%) cases required third sessions for complete clearance of stone. Overall clearance was achieved in 37 (92.5%) cases after 90 days in this group. Although more clearance rate was achieved in ESWL after push back, it was not statistically significant ($p > 0.05$). Danuser et al. (1993) also reported 96% stone free rates at 3 months after ESWL_ in situ and 94% stone free rate at 3 months after push back followed by ESWL. Similarly, Kumar et al. (1994) in a similar comparative study showed 80% clearance rate in group 1 and 88.5% clearance in group 2 at 3 months. These results compare favorably with our study although making comparison between them is difficult since the criteria for disintegration and the type of lithotripter used varied.

The number of average ESWL sessions in our study was 1.54 for stone <1 cm and 1.77 for stone of 1 cm in the in situ ESWL group (group 1). where as it was 1.46 and 1.48 respectively for stones <1 cm and of 1 cm respectively in the push back followed by ESWL group (group 2). Although less number of ESWL sessions were required in push back group, it was not statistically significant. In a study by Kumar et al. (1994), the number of average sessions was 1.86 1.2 and 2.03 1.2 respectively for in situ ESWL & ESWL after push back⁸.

In our study, more shock wave and energy was needed in the in situ ESWL, group than in ESWL after push back group. The mean shock wave was 1994 449 for group 1 and 1757.5 255 for group 2. The difference between the two groups was statistically very significant ($p < 0.01$). The mean energy used was 5.07 0.81 in group 1 and 4.6 t 0.48 in group 2 and this difference was also statistically significant ($p < 0.01$). However, Danuser et al. (1993) found that more shock wave and energy was required for in situ ESWL rather than ESWL after push back.

Post procedure complications like loin pain, hematuria, lower urinary tract symptoms (LUTS) and fever were more common in group 2 than in group 1 in our study and the differences were statistically highly significant. All these complications were treated by conservative measures. Similarly, the mean hospital stay was 1.06+ 0.24 days for group 1 while it was 2.4+0.74 days for group 2 which is again highly significant ($p < 0.001$).

Hendrix et al. (1990) in a similar study reported an average hospital stay of 0.85 and 1.2 days for in situ ESWL and ESWL after push back groups respectively⁹.

Although exact cost of the procedure could not be determined because the service charges among the patients were not homogenous due to the provision of free and paying beds. However, the cost of group 2 was higher due to the charges for the push back procedure in addition to the charges of ESWL. For ESWL and patients in group 1, they have to pay only a one time charge of Taka 15000 irrespective of the number of sessions required. Moreover, the mean hospital stay in group 2 was longer with more working day loss for the patient. Thus, ESWL after push back was costlier than in situ ESWL.

Conclusion

Considering the findings of this study, it can be concluded that in situ ESWL is a better option than ESWL after push back for the management of upper ureteric stones in selected group of patients and thereby avoids a more invasive procedure. Besides, ESWL after push back may be reserved for the case that fails to clear the stones after in situ ESWL. A major limitation of this study was the non homogenous nature of study subjects, so further study with homogenous and large sample size is recommended to determine the optimum treatment option for upper ureteric stones more precisely.

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