

Comparison between Urinary Tract Stones and Extracorporeal Shock Wave Lithotripsy (ESWL) in the Management of Proximal Ureteric Stone

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ABSTRACT

Background: Minimally invasive techniques have revolutionized the urological practice over the past few decades. Semi-rigid ureteroscopy and ESWL are two most commonly used minimally invasive techniques for managing proximal ureteric calculi.

Aim: To compare ureteroscopy and extracorporeal shock wave lithotripsy for the management of proximal ureteric stones 10-20mm in size in terms of mean operative time, modified EQ and complete clearance.

Study design: Randomized controlled trial.

Methodology: This study was carried out in the Department of Urology Lahore General Hospital Lahore from July 1st, 2018 to December 31st, 2018. A total of 114 (57 in each group) patients with proximal ureteric stone, 15 to 60 years of age of both genders were included. Patients with stone larger than 20mm, bleeding disorders, solitary kidney and ureteral pathology including tumor/stricture were excluded... Repeat ESWL was given for incomplete clearance in group B a maximum of 4 sessions of ESWL was given. Percutaneous nephrolithotomy was the auxiliary procedure employed for clearance of stones in such cases in both groups.

Results: The mean age of patients in group A was 36.05±9.29 years and in group B was 38.12±8.61 years. Out of 60 patients, 59 (51.75%) were males and 55 (48.25%) were females with male to female ratio of 1.1:1. We have found the mean operative time in ESWL group was 50.65±8.95 minutes and it was 37.21±3.87 minutes in URS group (p0.0001).

Conclusion: It is concluded that ureteroscopy is better than extracorporeal shock wave lithotripsy for proximal ureteric stone in terms of mean operative time, modified EQ and complete clearance.

Keywords: Ureteroscopy, Proximal ureteric stone, Stone clearance.

INTRODUCTION

Urinary tract stones are the 3rd commonest pathology of the urinary tract worldwide after urinary tract infections and disorders of prostate. Urolithiasis is a significant source of horribleness, influencing all geographical, social and racial groups. The lifetime hazard is around 10 to 15% in the developed world, yet can be as high as 20 to 25% in the Middle East. The expanded danger of dehydration in hot atmospheres, combined with a diet 50% lower in calcium and 250% higher in oxalates contrasted with Western diets regimens, represents the higher net hazard in the Middle East. In the Middle East, uric acid stones are more typical than calcium-containing stones. The prevalence rate of urolithiasis in Pakistan is approximately 12% with recurrence rates up to 50%.¹ The various management options available include drugs, extracorporeal shockwave lithotripsy (ESWL), laparoscopy and open ureterolithotomy.² Minimally invasive techniques have revolutionized the urological practice over the past few decades. Semi-rigid ureteroscopy and ESWL are two most commonly used minimally invasive techniques for managing proximal ureteric calculi.³ According to the guidelines laid down by the European Urology Association and Urology American Association ureteroscopy or ESWL are regarded as the first line treatment modality for the

management of proximal ureteric stones. But the choice of procedure remains a dilemma⁴.

ESWL is non-invasive, safe, easy to administer and does not require any special surgical skill or anesthesia and can be carried out on outpatient basis. However it has a high rate of recurrence and lower success rate in stones >1cm. URS on the other hand requires considerable surgical skill and anesthesia and has complications like bleeding and post-operative stricture formation but has a higher success rate. Cui et al thus recommended URS for proximal ureteric stones >1cm in size⁵.

METHODOLOGY

This study was carried out in the Department of Urology Lahore General Hospital Lahore from July 1st, 2018 to December 31st, 2018. A total of 114 (57 in each group) patients with proximal ureteric stone, 15 to 60 years of age of both genders were included. Patients with stone larger than 20mm, bleeding disorders, solitary kidney and ureteral pathology including tumor/stricture were excluded. In group A, urinary tract stones (URS) was done while in group B, extracorporeal shock wave lithotripsy (ESWL) was done. The outcome variables in both groups were the treatment rates and the stone free status at 2 weeks, modified efficiency quotient (EQ) and auxiliary procedure rates. Auxiliary procedure was the procedure carried out for complete clearance of stones after the primary procedure ureteroscopy in group A and ESWL in group B have failed.

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Repeat ESWL was given for incomplete clearance in group B a maximum of 4 sessions of ESWL was given. Percutaneous nephrolithotomy was the auxiliary procedure employed for clearance of stones in such cases in both groups.

RESULTS

Age range was 15-60 years with mean age of 37.65±8.87 years. The mean age of patients in group A was 36.05±9.29 years and in group B was 38.12±8.61 years. Majority of the patients 72 (63.16%) were between 15 to 40 years of age (Table 1). 59 (51.75%) were males and 55 (48.25%) were females with male to female ratio of 1.1:1 (Figure 1). Mean weight was 78.88±8.14kg (Table 2). Mean size of stone was 14.79±2.03mm (Table 3). The mean operative time in ESWL group was 50.65±8.95 minutes and it was 37.21±3.87 minutes in URS group (p=0.0001) (Figure 2). The modified efficiency quotient was 63.04% and 82.89% respectively which was statistically significant (p=0.003). The stone free rate was 52.63% and 84.21% in the two groups respectively (p0.0001) (Table 4).

Table 1: Age distribution for both groups (n=114)

Age (years)	Group A (n=57)		Group B (n=57)	
	No.	%	No.	%
15-40	36	63.16	36	63.16
41-60	21	36.84	21	36.84
Mean ± SD	36.05±9.29		38.12±8.61	

Figure 1: Distribution of patients according to Gender (n=114).

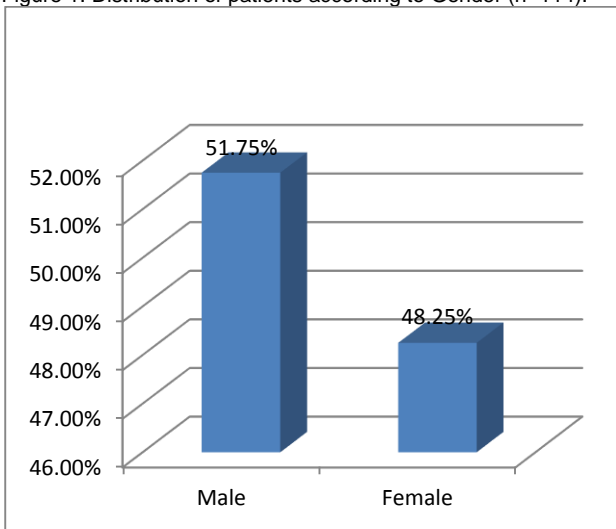
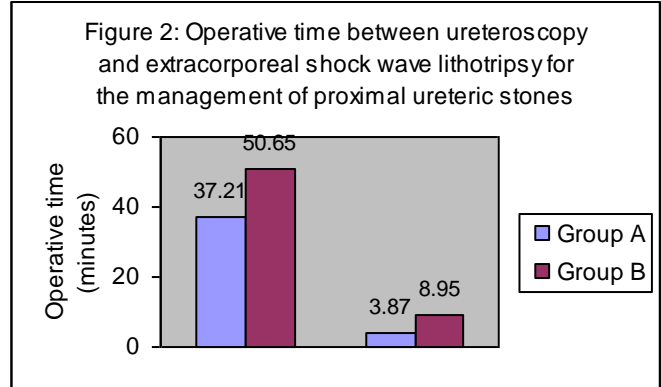


Table 2: Distribution of patients according to weight

Weight (kg)	Group A		Group B	
	No.	%	No.	%
40-70	11	19.30	08	14.04
71-100	46	80.70	49	85.96
Mean±SD	78.0±8.57		80.49±7.80	

Table 3: Distribution of patients according to size of stone.

Size of stone (mm)	Group A		Group B	
	No.	%	No.	%
10-15mm	35	61.40	33	57.89
16-20mm	22	38.60	24	42.11
Mean ± SD	14.86±1.99		14.75±2.26	



P-value = 0.0001 which is statistically significant

Table 4: Outcome in both Groups (n=114).

Outcome		Group A		Group B		P value
		No.	%	No.	%	
Complete clearance	Yes	48	84.21	30	52.63	0.0001
	No	09	15.79	27	47.37	
Modified efficiency quotient	Yes	82.89	82.89	63.4	63.4	0.003
	No	17.11	17.11	36.96	36.96	
Use of auxiliary procedure	Yes	24	42.11	28	49.12	0.452
	No	33	57.89	29	50.88	

DISCUSSION

Urolithiasis is one of the leading cause of morbidity of urinary tract system in world. Within the last few decades the treatment of urinary tract stones has been revolutionized due to introduction of minimally invasive techniques⁶. Few decades back ureteral stones were managed by open ureterolithotomy. Each of these modalities have high efficacy when used for the appropriate indication both in adults and children. Preferences of patients and surgeons play a pivotal role in the decision of choosing one or the other procedure.⁷ For treating proximal ureteral stones, SWL is a minimally invasive procedure and can be performed as an outdoor patient procedure, however it has disadvantages as well, such as a high re-treatment rate, long treatment time, and poor patient compliance in some cases.⁸ There are surgeons who are very cautious in using semi-rigid URS for proximal ureteral stones especially in male patients because of longer working distance compared to female patients⁹.

In some studies it was found that compared with the SWL group treatment cost was higher in the URS group due to hospitalization and inpatient costs. The best modality for the treatment of ureteral stones is still debatable¹⁰. Patients who stay far from hospital more probably choose URS over SWL to avoid frequent visits because of its high success rate for single treatment.¹¹ Patient's economic status also effects satisfaction level of the patients regarding choice of URS or SWL for treating their ureteral stones especially in a society like Pakistan where people with middle and low-income levels have difficulty in coping with the costs incurred in private setups. In literature there is a controversy regarding the financial burden on patients¹².

Kumar et al found the mean operative time in ESWL

group was 49.2±1.7 minutes and it was 39.1±1.5 minutes in URS group (p0.31). The modified efficiency quotient was 46.4% and 83.4% respectively which was statistically significant (p 0.01). In a study with 71 patients having upper ureteral stones of 5 to 10mm, Karlsen and his associates have connected ESWL to 33 patients and URS to 38 patients and recorded stone freedom of 58% in ESWL group and 78% in URS gathering, 3 weeks after the applications. Similar patients had 88% stone leeway in ESWL and 89% in URS, following 3 months. The requirement for analgesics, dysuria, hematuria and lumbar torment has been altogether higher in ESWL group patients.¹³ Al-marhoon et al in 2013 conducted the extracorporeal shock wave lithotripsy was an effective and reliable option for ureteric stones up to 2cm size with clearance rates as high as 88%⁷.

The success rate of URS has been around 80% in the proximal ureter. It is seen that URS has a higher stone-free rate for stones smaller than or equal to 10mm in the distal ureter and stones bigger larger than 10mm in the proximal ureter.¹⁴ It is pertinent here that besides the influence of stone size and position, the efficiency of the URS procedure depends on the experience and skill of the operating urologist as well.¹⁵ Fong et al experienced an overall stone free rate of 50% in ESWL and 80% in URS.¹⁶ Kawano et al found that 83.6% of patients with proximal ureteric stone became stone free after one session of ESWL.¹⁷ Singh et al achieved stone free rate of 83.3% but with high retreatment rate of about 60% after ESWL¹⁸ Tawfick accomplished the 92% stone free rate with ureteroscopic lithotripsy of proximal ureteric stone and introductory stone free rate for in situ SWL was 58%¹⁹.

CONCLUSION

This study concluded that ureteroscopy is better than extracorporeal shock wave lithotripsy for proximal ureteric stone in terms of mean operative time, modified EQ and complete clearance. So, we recommend that ureteroscopy should be preferred over extracorporeal shock wave lithotripsy for proximal ureteric stone in order to improve the outcome of these patients.

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