ESWL FOR UPPER URETERIC STONE WITH AND WITHOUT JJ STENT-A COMPARATIVE STUDY

PROMODE RANJAN SINGH[1], MD. ABDUL ALIM[2], MD. SHAFIQUL ISLAM[2], KAISER AHMED[1], JALAL AHMED CHOUDHURY[2]

[1]Department of Urology, Sylhet MAG Osmani Medical College, Sylhet, [2]Department of Surgery, Sylhet MAG Osmani Medical College Hospital, Sylhet

Abstract:

Objective: *To find out the outcome of stenting before ESWL in the management of upper ureteric stone.*

Methods and materials: *This prospective comparative study was conducted in the department of urology, Sylhet Osmani Medical College Hospital from January 2011 to June 2012. Sixty two patients with upper ureteric stone, aged between 18 to 60 years irrespective of sex, unilateral radio opaque upper ureteric stone of greatest diameter 2cm, patients with normal renal function and negative urine culture and were agreed to participate in the study were selected. Selected 62 patients with upper ureteric stones were divided randomly into group-A and group-B each consisting 31 patients. The patients of group-A were treated with ESWL with a JJ stent and that of group-B without JJ stent. In the patients selected for JJ placement, a 5 fr JJ stent was placed under regional anaesthesia before ESWL. Siemens Lithotripsy ESWL machine was used to impart shock waves and 3500 shockwaves was given in a session. Both the groups were compared for stone clearance, ureteric colic, steinstrasse, fever, lower urinary tract symptoms (LUTS), number of ESWL sessions. Data were processed and analyzed using software SPSS.*

Results: *The number ESWL session in stented group [single session 10 (32.3%) and multiple sessions 21 (67.7%)] and in non-stented group [single session 9 (29.0%) and multiple sessions 22 (71.0%)] was similar in both groups (p>0.05) Stones were cleared in 23 (74.2%) patients in stented group and 25 (80.6%) patients in non-stented group. Difference was not statistically significant (p>0.05). Ureteric colic was significantly fewer in stented group than that of non-stented group [4 (12.9%) vs 11 (35.5%); p<0.05] but surapubic pain was significantly more in stented group than that of non-stented group [13 (41.9%) vs 5 (16.1%); p<0.05]; while steinstrasse [3 (9.7%) vs 5 (16.1%); p>0.05] and fever [5 (16.1%) vs 2 (6.5%); p>0.05] did not differ statistically significant between groups. Lower urinary tract symptoms such as urinary frequency [15 (48.4%) vs 3 (9.7%); p<0.01]; urgency [17 (54.8%) vs 5 (16.1%); p<0.01] and dysuria [19 (61.3%) vs 6 (19.4%); p<0.01] were significantly more in stented group than that of non-stented group; but gross haematuria [21 (67.7%) vs 15 (48.4%); p>0.05] were more in stented group.*

Conclusion: *ESWL is an effective and reasonable initial therapy in the management of upper ureteric stones measuring ≤2 cm. Pre-ESWL ureteric stenting provides no additional benefit over non-stented ESWL in their management. Moreover, stents are associated with signiûcant patient discomfort and morbidity.*

Key Words: *Upper ureteric stones; ESWL.*

Bangladesh J. Urol. 2014; 17(1): 17-22

Introduction:

Urolithiasis is one of the most prevalent urological disorders[1], and the prevalence of urinary stones has increased in most countries. In the United Kingdom at least 1 renal stone will form in approximately 8% of male and 4% of female population , and in the United States the male lifetime prevalence has increased to 15%[2]. Renal stone is a common problem in Bangladesh because of geographical location, economic and dietary factors, dehydration, exposure to heat and possible genetic factors[3]. The management of urinary calculi was revolutionized by the advent of Extra Corporeal Shock Wave Lithotripsy in 1980s, propelled

Correspondence: Promode Ranjan Singh, Department of Urology, Sylhet MAG Osmani Medical College, Sylhet, Mobile: 01711848879, E-mail: prsingh_urology@yahoo.com.

the treatment of renal stone disease from mainly open surgery into a new era of non invasive procedures[4]. The extracorporeal shockwave lithotripsy is a safe, effective and minimally invasive method and is now the ûrst choice of treatment for most upper urinary calculi. Most fragments pass uneventfully through the urinary tract after extracorporeal shockwave lithotripsy[2]. However, fragments may obstruct the ureter, thus leading to post- extracorporeal shockwave lithotripsy complications such as acute renal pain, hydronephrosis, infection and renal failure[5]. Success rates and complications are determined by the size, location and composition of the stone in the urinary tract, the type of lithotriptor, shock wave energy and rate, and anatomical characteristics. Fragments may become impacted in the ureter and form steinstrasse after extracorporeal shockwave lithotripsy, but no agreement has yet been reached that ureteric stenting could be used to prevent steinstrasse and other post- extracorporeal shockwave lithotripsy complications[6]. The European Association of Urology recommends pre- extracorporeal shockwave lithotripsy stenting for renal stones with a diameter greater than 20 mm (approximately 300 mm^2), and a double J stent to reduce obstructive and infective complications after the use of extracorporeal shockwave lithotripsy[2,7]. Ureteric stents may aid in the passage of stone fragments secondary to the passive ureteric dilation that occurs with indwelling ureteric stenting. Furthermore, it has also been thought that stenting may promote ureteric healing and prevent ureteric stricture. Because of their usefulness for facilitating drainage, ureteric stents are commonly placed to relieve or prevent ureteric obstruction, inflammatory reaction, or urine leakage[8]. However, recognized complications have been associated with the use of stents with reports and 10% to 85% incidence of stent related symptoms and/ or morbidity are reported[9]. After stent placement, bladder irritation, hematuria, and flank pain seem to be the major side effects and may be caused by vesicoureteric reflux, irritation, infection, obstruction caused by encrustation, or stent migration[8,10,11]. Moreover, ureteric stenting is considered a relatively invasive procedure and add some expense to the overall procedure of ureteroscopy and unless a pull string is routinely used at the distal end of the stent secondary cystoscopy is required for stent removal[9]. Several studies have reported that double J stent insertion does not improve extracorporeal shockwave lithotripsy results[12]. Stents are associated with signiûcant symptoms of discomfort such as urinary frequency, urgency, dysuria, hematuria etc. Joshi et al suggested that indwelling ureteric stents resulted in a negative functional capacity and utility values, and a decreased quality of life in up to 80% of patients[2,13]. So, it is still controversial whether stents should be considered routinely before ESWL for treating upper ureteric calculi.

Methods and materials:

This prospective comparative study was conducted in the Department of Urology, Sylhet Osmani Medical College Hospital from January 2011 to June 2012**.** Patients with unilateral radio opaque upper ureteric stone measuring 2 cm ± 2mm, age between 18 and 60 years, with normal renal functions, having normal ureter on IVU and having negative urine culture were selected. Patients with radiolucent stones, renal failure, bleeding disorders**,** patients with history of previous renal surgery or extra corporeal shock wave lithotripsy or endoscopy**,** congenital renal abnormalities**,** patient those were not interest to participate in the study were excluded. Sixty two patients with upper ureteric stones were selected and were divided them randomly into two equal groups of 31 patients each.Group A were selected for ESWL with placement of JJ stent and group B without JJ stenting. A predesigned structured questionnaire was filled to collect data which includes detailed history, clinical examinations and baseline investigations. In the patients selected for JJ placement, a 5.0 FR JJ stent was placed under regional anaesthesia before ESWL. Selected patients were treated with ESWL by Siemens Lithoskop ESWL machine at the Department of Urology, Sylhet Osmani Medical College Hospital. Every patient was monitored in ward and was discharged on the next morning. Each patient was followed after 1 week with plain X-ray KUB and ultrasound KUB to detect clearance and to assess the need for further treatments. Later patients were checked at one, two and three months in which plain X-ray KUB and ultrasound KUB were repeated. For each group stone clearance (defined as no calculi visible on X ray KUB and less than 4 mm fragments on ultrasound KUB),[4] ureteric colic, steinstrasse, frequency, urgency, dysuria, suprapubic pain, gross hematuria, fever, number of ESWL sessions were recorded. JJ stent were removed when the stone disappeared or at three months. Data were processed and analyzed with the help of SPSS (Statistical package for social sciences) Version 16.0.

Result :

Sixty two patients with upper ureteric stones were selected and were divided them randomly into group-A

and group-B each consisting 31 patients. Patients of group-A were treated with ESWL with JJ stent and group-B were treated with ESWL without JJ stent. The age of the patients ranged from 18 to 60 years with the mean age of 36.1 (±11.1) years. The age of the patients ranged from 18 to 60 years with the mean age of 36.9 (±11.0) years in group-A; whereas the age of the patients in group-B ranged from 18 to 50 years with the mean age of 35.4 (±11.3) years. Among the total 62 patients 46 (74.2%) patients were male and 16 (25.8%) patients were female with male to female ratio of 2.76:1. The patients who exhibited residual stone after first session on follow up were given further sessions. Patients with no stone up to 3rd session were termed as stone cleared. In group-A 10 (32.3%) patients had needed single session ESWL and 21 (67.7%) patients had needed multiple sessions ESWL; while in group-B 9 (29.0%) patients had needed single session ESWL and 22 (71.0%) patients had needed multiple sessions ESWL Number of ESWL session did not differ between group A and group-B ($\div^2$=0.076; p>0.05).

Table- I

Distribution of patients by ESWL session

ESWL session	Study group		p value
	Group-A (n=31)	Group-B (n=31)	
Single session	10 (32.3)	9 (29.0)	*p>0.05
Multiple session	21 (67.7)	22 (71.0)	

*Chi-Square (χ^2) Test was applied to analyze the data.
Figure in the parenthesis indicates corresponding percentage.

Stone clearance:

Table-II showed the distribution of the patients according to clearance of stone.

Table- II

Distribution of the patients according to clearance of stone

Stone clearance	Study group		p value
	Group-A (n=31)	Group-B (n=31)	
Cleared	23 (74.2)	25 (80.6)	*p>0.05
Residual stone	9 (25.8)	7 (19.4)	

*Chi-Square (χ^2) Test was applied to analyze the data.

Figure in the parenthesis indicates corresponding percentage.

Complications after ESWL :

Table-III showed distribution of the patients by complications. Ureteric colic was significantly fewer in group-A than that of group-B [4 (12.9%) vs 11 (35.5%); $\div^2$=4.309; p<0.05] but surapubic pain was significantly more in group-A than that of group-B [13 (41.9%) vs 5 (16.1%); $\div^2$=5.010; p<0.05]; while other complications such as steinstrasse [3 (9.7%) vs 5 (16.1%); $\div^2$=0.574; p>0.05] and fever [5 (16.1%) vs 2 (6.5%); $\div^2$=1.449; p>0.05] did not differ statistically significant between groups.

Table- III

Distribution of the patients by complications

Complications	Study group		*p value
	Group-A (n=31)	Group-B (n=31)	
Ureteric colic	4 (12.9)	11 (35.5)	p<0.05
Steinstrasse	3 (9.7)	5 (16.1)	p>0.05
Fever	5 (16.1)	2 (6.5)	p>0.05
Surapubic pain	13 (41.9)	5 (16.1)	p<0.05

*Chi-Square (χ^2) Test was applied to analyze the data.
Figure in the parenthesis indicates corresponding percentage.

Post ESWL Lower Urinary Tract Symptoms:

Urinary frequency [15 (48.4%) vs 3 (9.7%); $\div^2$=11.273; p<0.01]; urgency [17 (54.8%) vs 5 (16.1%); $\div^2$=10.145; p<0.01] and dysuria [19 (61.3%) vs 6 (19.4%); $\div^2$=11.328; p<0.01] were significantly more in group-A than that of group-B; but gross haematuria [21 (67.7%) vs 15 (48.4%); $\div^2$=2.385; p>0.05] did not differ statistically significant between groups.

Table- IV

Distribution of the patients by lower urinary tract symptoms (LUTS)

Lower urinary tract symptoms	Study group		*p value
	Group-A (n=31)	Group-B (n=31)	
Urinary frequency	15 (48.4)	3 (9.7)	p<0.01
Urgency	17 (54.8)	5 (16.1)	p<0.01
Dysuria	19 (61.3)	6 (19.4)	p<0.01
Gross haematuria	21 (67.7)	15 (48.4)	p>0.05

*Chi-Square (χ^2) Test was applied to analyze the data.
Figure in the parenthesis indicates corresponding percentage.

Discussion:

Urinary obstruction caused by an impacted stone is a serious problem as it may lead to progressive kidney dysfunction or severe complications, including pyonephrosis and sepsis. Stone impaction was thought to inûuence the success of fragmentation during ESWL. This fear has led many urologists to recommend JJ stenting before ESWL to create an artiûcial chamber, with an improved stone-ûuid interface, for better fragmentation during ESWL and to relieve the obstruction[14]. However, this view has been challenged by some, who showed that the results of treatment are similar with or without a stent. This study has designed to assess the necessity and complications of stenting before extracorporeal shock wave lithotripsy in the management of upper ureteric stones. Age of the patients ranged from 18 to 60 years with the mean age of 36.1 (±11.1) years. The age of the patients ranged from 18 to 60 years with the mean age of 36.9 (±11.0) years in stented group; whereas the age of the patients in non-stented group ranged from 18 to 50 years with the mean age of 35.4 (±11.3) years. The mean age of the patients of both groups did not show any significant difference (p>0.05). Mohayuddin et al[4]. found nearly similar results that the mean patient age was 32.13 ± 11.5 years in non stented group and 34.3 ± 11.35 years in stented group. Wazir et al[15]. reported the mean age was 40.15 years in urinary stone disease. In the present study among the total 62 patients 46 (74.2%) patients were male and 16 (25.8%) patients were female with male to female ratio of 2.76:1. There were 24 (77.4%) male and 7 (22.6%) female in stented group; whereas 22 (71.0%) male and 9 (29.0%) female in non-stented group. The sex of the patients of stented group and non-stented group did not show any statistically significant difference p>0.05). This result was supported by Wazir et al[15]. that among their 625 patients 463 (74.04%) patients were male and 162 (25.9%) patients were female. In this study 10 (32.3%) patients had needed single session ESWL and 21 (67.7%) patients had needed multiple sessions ESWL in stented group; while in non-stented group 9 (29.0%) patients had needed single session ESWL and 22 (71.0%) patients had needed multiple sessions ESWL. Number of ESWL session did not differ between group A and group-B (p>0.05). This result was correlated with Ghoneim et al[6]. that single ESWL session was required in 7 (23.3%) patients in the stented group and 10 (33.3%) patients in the non-stented group. Multiple ESWL sessions (re-treatment rate) were required in 23 (76.7%) patients in the stented group and 20 (66.7%) in the non-stented group. The difference was not found to be statistically significant (P=0.436).

In the present study stones were cleared in 23 (74.2%) patients in stented group and 25 (80.6%) patients in non-stented group. Residual stones remained in 9 (25.8%) patients in group A and in 7 (19.4%) patients in group B. Rate of clearance of stone between groups did not differ statistically significant (p>0.05). This result was in accordance with the study of Mohayuddin et al[4]. that stone was cleared in 31 (77.5%) patients in stented group and 33 (87.5%) patients in non-stented group (p = 0.57). In the study by Musa et al[16]. stone free rate was 88% in the in the stented group vs 91% in the unstented group Ghoneim et al[6]. found that stone-free rate at 3 months was comprising 27 (90%) in the stented group and 26 (86.7%) in the non-stented group. Ghoneim et al[6]. found that stone-free rate at 3 months was comprising 27 (90%) in the stented group and 26 (86.7%) in the non-stented group. In the current study surapubic pain was significantly more in stented group than that of non-stented group [13 (41.9%) vs 5 (16.1%); p<0.05]. Ghoneim et al[6]. supported this result that surapubic pain was significantly higher in stented group than that of non-stented group [10 (33.3%) vs 3 (10.0%); p=0.014].

This study showed that steinstrasse [3 (9.7%) vs 5 (16.1%); p>0.05] did not differ statistically significant between stented group and non-stented group. This finding was similar to the study of Mohayuddin et al[4]. that steinstrasse developed in 7.5% patients in stented group and in 10% patients in non-stented group (P=0.69). Ghoneim et al[6]. found a single case had steinstrasse (3.3%) in the non-stented group compared with none in the stented, which cleared spontaneously, with no need for secondary intervention. However, steinstrasse may occur even in the presence of a ureteric stent. El-Assmy et al[17]. found that the incidence of steinstrasse was doubled in the stented vs the non-stented patients (4.3% vs 2.1%). Fever in this study [5 (16.1%) vs 2 (6.5%); p>0.05] did not differ statistically significant between stented group and non-stented group. Ghoneim et al[6]. found that 1 (3.3%) patient in the stented group and 2 (6.7%) patients in the non-stented group, experienced self-limited fever (>38.5°C). The difference was not statistically signiûcant (P=0.719). Similarly Mohayuddin et al[4]. found the number of patients presenting with high grade fever and sepsis was 3 (7.5%) in stented group and 1 (2.5%) in non-stented group (p=0.305). In a study by Musa[16], that there was slightly higher

incidence of fever in stented patients. This could be explained by the fact that patients with JJ stent had two additional procedures performed and a foreign body was placed in a normally sterile system[4].

This study showed that urinary frequency [15 (48.4%) vs 3 (9.7%); p<0.01]; urgency [17 (54.8%) vs 5 (16.1%); p<0.01] and dysuria [19 (61.3%) vs 6 (19.4%); p<0.01] were significantly more in stented group than that of non-stented group; but gross haematuria [21 (67.7%) vs 15 (48.4%); p>0.05] did not differ statistically significant between stented group and non-stented group. This results were in line with the study of Mohayuddin et al[4]. that the lower urinary tract symptoms e.g urinary frequency, urgency, dysuria and haematuria were quite high in the stented group (45%, 12.5%, 47.5%, 57.5%, 92.5%) as compared to non-stented group (7.5%, 2.5%, 10%, 15%, 67.5%) respectively. In stented group overall lower urinary tract symptoms were found in 51% versus 20.5% in non-stented group (p=0.005)[4]. This is also similar to the findings of the other studies e.g Perminger et al[18]. found a higher incidence of LUTS in patients with JJ stents than in the control group (43% vs 25%). A statistically signiûcant difference was found between the two groups as dysuria, urgency and frequency of micturition. These symptoms were all found to be higher in the stented group. Although gross haematuria were found to be higher in the stented group the difference was not statistically signiûcant. It was suggested that LUTS clearly attributed to the stent itself acting as a foreign body in the urinary bladder irritating the trigone and the bladder neck[4,6].

Conclusion

From this study it is concluded that ESWL is an effective and reasonable initial therapy in the management of upper ureteric stones of greatest diameter of 2 cm. Pre-ESWL ureteric stenting provides no additional beneût over non-stented ESWL in their management. Moreover, stents are associated with signiûcant patient discomfort and morbidity.

Conflict of Interest : None Declared

References

1. Teichman JM: Clinical practice. Acute renal colic from ureteric calculus. N Engl J Med 2004; 350: 684.
2. Pengfei S, Min J, Jie Y, Xiong L, Yutao L, Wuran W, et al. Use of Ureteric Stent in Extracorporeal Shock Wave Lithotripsy for Upper Urinary Calculi: A Systematic Review and Meta-Analysis. J Urol 2011;186: 1328-35.
3. Hussain M, Lal M, Ali B, Naqvi SA, Rizvi SAH. Urolithiasis in Sindh: a single centre experience with a review of 10,000 cases. J Nephrol Urol Transplant 1998; 1: 10-3.
4. Mohayuddin N, Malik HA, Hussain M, Tipu SA, Shehzad A, Hashmi A. et al. The outcome of Extracorporeal Shockwave Lithotripsy for Renal Pelvic Stone with and without JJ Stent - a comparative study. J Pak Med Assoc 2009; 59 (3):43-6.
5. Salem S, Mehrsai A, Zartab H Nematollah Shahdadi and Gholamreza Pourmand Complications and outcomes following extracorporeal shock wave lithotripsy: a prospective study of 3,241 patients. Urol Res 2010; 38: 135.
6. Ghoneim IA, El-Ghoneimy MN, El-Naggar AE, Hammoud KM, El-Gammel MY, Morsi AA. Extracorporeal shock wave lithotripsy in impacted upper ureteric stones: A prospective randomized comparison between stented and non-stented techniques. Urology 2010;75:45-50.
7. Türk C, Knoll T, Petrik A, Sarica K, Straub M, Seitz C, et al. Guidelines on Urolithiasis. European Association of Urology 2011; p 28.
8. Hao P, Li W, Song C, Yan J, Song B, Li L. Clinical Evaluation of Double-Pigtail Stent in Patients with Upper Urinary Tract Diseases: Report of 2685 Cases. J Endourol 2008; 22 (1):65-71.
9. Denstedt JD, Wollin TA, Sofer M, Nott L, Weir M, R. D'a Honey RJ. A prospective randomized controlled trial comparing nonstented versus stented ureteroscopic lithotripsy. J Urol 2001;165: 1419–22.
10. Chew BH, Davoudi H, Li J, Denstedt JD. An In Vivo Porcine Evaluation of the Safety, Bioavailability, and Tissue Penetration of a Ketorolac Drug-Eluting Ureteric Stent Designed to Improve Comfort. J Endourol 2010; 24 (6): 1023-9.
11. Sountoulides P, Pardalidis N, Sofikitis N. Endourologic Management of Malignant Ureteric Obstruction: Indications, Results, and Quality-of-Life Issues. J Endourol 2010; 24 (1): 129-42.
12. Whitûeld HN: The management of ureteric stones. Part II: therapy. BJU Int 1999; 84: 916-21.
13. Joshi HB, Stainthorpe A, MacDonagh RP, Keeley FX Jr, Timoney AG, Barry MJ. Indwelling ureteric

stents: evaluation of symptoms, quality of life and utility. J Urol 2003; 169: 1065-9.

14. Morgentaler A, Bridge SS, Dretler SP. Management of the impacted ureteric calculus. J Urol. 1999;143:263-266.
15. Wazir BG, Iftikhar ul Haq M, Faheem ul Haq, Nawaz A, Ikramullah AN, Jamil M. Experience of extracorporeal shockwave lithotripsy for kidney and upper ureteric stones by electromagnetic lithotriptor. J Ayub Med Coll Abbottabad 2010;22(2):20-2.
16. Musa AA. Use of double J stent prior to extra corporeal shock wave lithotripsy is not beneficial: results of a prospective randomized study. Int Urol Nephrol 2007; 40:19-22.
17. El-Assmy A, El-Nahas AR, Sheir KZ. Is pre-shock wave lithotripsy stenting necessary for ureteric stones with moderate or severe hydronephrosis? J Urol 2006;176:2059-62.
18. Preminger GM, Kettelhut MC, Elkins SL, Seger J, Fetner CD. Ureteric stenting during extracorporeal shock wave lithotripsy: help or hindrance? J Urol 1989; 142: 32-6.

Abbreviations

ESWL : Extracorporeal shock wave lithotripsy
LUTS : Lower urinary tract symptoms