

# Outcome of Retrograde Ureteroscopy for the Management of Ureteric Calculi: Four Years Experience

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## ABSTRACT

**Objectives:** To ascertain the efficacy of transurethral Ureteroscopy (URS) and Pneumatic Lithoclasty for the management of ureteral stones.

**Place and duration of study:** This retrospective study was conducted from December 2005 to December 2009 at the Department of Urology and Renal Transplantation, Allied Hospital/Punjab Medical College, Faisalabad and Hospitals in Private sector. **Methods:** Patients with stones of different sizes and at different levels in the ureter were included in the study. Patients of less than 12 years of age and also patients with ureteric stones more than 3 cm were not included in the study. Such stones were managed by open Ureterolithotomy

**Results:** A total number of 540 patients with ureteric calculi were included in the study. Cause of ureteric obstruction was stones in all cases. Among these 450 patients, 209 (38.6%) patients presented with lower ureteric stones, 266 (49.20%) patients presented with stones in the mid ureter, 65 (12.2%) patients presented with stones in the upper ureter. Bilateral ureteric calculi were present in 95 (17.5%) cases. Out of 540 cases 57 (10.62%) patients presented with anuria and they were initially treated by Percutaneous Nephrostomy PCN to relieve the obstruction followed by URS and Lithoclasty.

Overall, ureteric stones at different levels and of different sizes were treated successfully in 480 (89.0%) patients and in remaining 60 (11.0%) patients stones could not be broken. Stones were successfully fragmented and cleared in the 198 (94.73%) of 209 patients with stones in the lower ureter, in 253 (95.11%) of 266 patients with stones in the mid ureter and in 29 (44.61%) of 65 patients with stones in the upper part of ureter. Stones were successfully fragmented in 347 (98.21%) out of 354, 92 (85.18%) out of 108 and 41 (52.56%) out of 78 patients with stone sizes of <1 cm, 1-2 cm and 2-3 cm respectively. DJ stents were inserted in 426 (78.81%) cases. Procedure was not successful in 60 (11.0%) patients. Stones were migrated up in to renal pelvis in 31 (5.73%) patients, stone fragmentation failure was in 13 (2.40%) patients, failure of URS insertion up to stone was in 6 (1.10%) patients and ureteric avulsion was in 1 (0.18%). **Conclusion:** Transurethral rigid Ureteroscopy is still an acceptable procedure in the treatment of ureteric calculi of different sizes at different levels and it can be used safely with very good results in expert hands.

**Keywords:** Ureteroscopy, Lithoclast, Double J Stent, Percutaneous Nephrostomy.

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## INTRODUCTION

The incidence of urinary stone disease is the 3<sup>rd</sup> highest among all urinary problems[1]. These stones may grow and enlarge in the kidney or may enter into the ureter. The spontaneous passage of stones is 80% in patients with stone size less than 4 mm and spontaneous passage is very low when the stone size is more than 7mm. So when the size of the stone in the ureter becomes more than 6-7 mm then it needs active manipulation for the stone removal[2].

According to site, size and other factors, there are many treatment options for the removal of the stone from the ureter like conservative, Extracorporeal Shock Wave Lithotripsy ESWL, stone fragmentation through antigrade or retrograde Ureteroscopy URS, Laparoscopic and open Ureterolithotomy[3,4]. Among all of the above, stone fragmentation with ESWL and retrograde Ureteroscopy URS with Lithoclast are the preferred minimal invasive procedures[5]. The

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presence of bowel loops and bones intervenes at different parts of ureter and reduces the efficacy of ESWL[6]. Simultaneous bilateral stone fragmentation with ESWL is not advised usually but bilateral ureteric stones can be managed with URS[7]. Whole of the ureter can be accessed easily with retrograde transurethral Ureteroscopy (URS). Stones are visualized easily with URS and through this stones can be fragmented with many types of Lithoclasts like Pneumatic, Electrohydraulic, Ultrasound and Lasers [8]. Very large impacted, and / or multiple Ureteric stones are not well managed with URS or ESWL. Laparoscopic or open ureterolithotomy are the preferred treatment options for these situations [9]. The immediate and long term complication rate with URS varies with the expertise of the surgeon [10]. Ureteric stents are used at the end of the URS if stone fragments after URS are multiple and have big stone burden. Ureteric stenting is optional in case of uncomplicated URS [11,12]. The use of flexible URS along with stone fragmentation with Lasers is the best option in this regard. The cost and wear tear of flexible URS is very high[13,14]. Mostly rigid URS is used in our setup So outcome of ridged URS in treatment of stones is assessed in our setup.

#### **MATERIAL AND METHODS**

This retrospective study was conducted at Department of Urology and Renal Transplantation, Punjab Medical College/Allied Hospital, Faisalabad and Hospitals in the Private sector from December 2005 to December 2009.

Patients who presented with symptoms and signs of ureteric obstruction due to ureteric stones through OPD or through emergency department were included in the study. Patients less than 12 years of age were excluded from the study. Patients having ureteric stone size more than 3 cm were also not included in the study. Patients were fully evaluated with routine lab test, blood sugar, urea, serum creatinine along with ultrasonography, X-ray KUB and Intravenous Urography IVU if the renal profile were in normal range. DTPA renal scan was performed in patients with non excretion of contrast material on IVU or if renal profiles were raised. Transurethral rigid Ureteroscopy (URS) was performed in haemodynamically stable patients with ureteric obstruction due to stone at any level.

This procedure was done in lithotomy position with 8.5 Fr rigid Ureteroscope under Spinal Anesthesia.

Only mild sedation was given to patients who were unfit for General Anesthesia or Spinal Anesthesia. Ureteroscope was inserted through ureteric orifice with/without dilatation over guide wire. Site and size of the stone in the ureter was seen by Ureteroscopy URS. Stone was fragmented with Pneumatic Lithoclast in one sitting. Ureteric stent 4.7 Fr was placed through Ureteroscope if stone fragments were multiple and migrated up. Percutaneous Nephrostomy PCN was done before URS in patients with anuria to stabilize the patients before the retrograde endoscopic procedure. Success of procedure was noted for stones in the ureter in the lower, middle and upper ureter. Success of the procedure was also noted in terms of stone size (< 1 cm, 1 -2 cm, 2 – 3cm). Causes of the failure of the procedure were observed. Complications of the procedure were also noted.

#### **RESULTS**

There were 540 patients with ureteric obstruction due to ureteric stones. Among them 394 (73%) were male and 167 (27%) were females. Left and right ureteric stones were present in 292 (54%) and 248 (46%) respectively and 95 (17.5%) had bilateral ureteric stones. Mean age of the patients was 34 ±14 years. The size of the stone in the treated patients was in the range 6-30 mm. Ureteric stones were present in the lower part of 209 (38.6%) patients, in mid ureter 266 (49.20%) patients, in upper ureter 65 (12.2%) patients. Size of the stone was 0.5 cm to 1 cm in 354 (65.50%) patients, 1 cm to 2 cm in 108 (19.98%) patients and 2 cm to 3 cm in 78 (14.52%) patients. Radiopaque stones were present in 416 (77%) and radiolucent stones were present in 124 (23%) of the patients. Bilateral ureteric obstruction was present in 95 (17.5%) patients and 57 (10.62%) patients presented with anuria. Stones were approached with Ureteroscope and fragmentation was done with Pneumatic Lithoclast. Stones were completely removed in 480 (89%) of patients.

Stones were successfully fragmented and cleared in the 198 (36.4%) patients with stones in the lower ureter, in 253 (46.80%) patients with stones in the mid ureter and in 29 (5.36%) patients with stones in the upper part of ureter. The individual success rate of the procedure for the stone of the lower ureter, mid ureter and upper ureter was 94.73%, 95.11% and 44.61% respectively. Procedure was unsuccessful in 11 (2.04%) patients with stones in the lower ureter, in 13 (2.30%) patients with stones in the mid ureter and in

36 (6.66%) patients with stones in the upper part of ureter.

**Table:-1:  
Results of URS and Pneumatic Lithoclasty for Ureteric Calculi at Different Levels**

Site of the Stone in Ureter	No. of Patients pt(%)	Success of Procedure pt(%)	Failure of Procedure pt(%)
Lower Ureter	209(38.6%)	198(36.64%)	11(2.04%)
Middle Ureter	266(49.20%)	253(46.80%)	13(2.30%)
Upper Ureter	65(12.2%)	29(5.36%)	36(6.66%)
Total	540(100%)	480(89.0%)	60(11.00%)

Stones were successfully fragmented and cleared in 347 (64.20%) patients with stone size <1 cm, in 92 (17.22%) patients with stone size 1-2 cm and in 41 (7.58%) patients with stone size 2-3 cm. This procedure was not successful in 7 (1.20%) patients with stone size <1 cm, in 16 (2.96%) patients with stone size 1-2 cm and in 37 (6.84%) patients with stone size 2-3 cm. The individual success rate of the procedure for the ureteric stones size <1cm, 1-2cm and 2-3cm was 98.21%, 85.18% and 52.56% respectively. Ureteric stents were passed in 426 (78.81%) patients. There were 114 (21.09%) patients who were sent without ureteric stent. Ureteric stents were passed after Ureterscopy URS and stone fragmentation in all 108 (19.98%) patients with stone size of 1-2 cm and also all 78 (14.52%) patients with stone size 2-3 cm. Ureteric stents were placed in 240(44.4%) of 354 patients with stone size less than 1 cm.

**Table:-2:  
Results of URS and Pneumatic Lithoclasty for Ureteric Calculi of Different Sizes**

Size of Stone	No. of Patients	Success	Failure
< 1cm	354(65.50%)	347(64.20%)	7(1.20%)
1 -2cm	108(19.98%)	92(17.22%)	16(2.96%)
2-3cm	78(14.52%)	41(7.58%)	37(6.84%)
Total	540(100%)	480(89.00%)	60(11.00%)

Ureterscope URS could not be entered through the ureteric orifice or kink in the Ureter could

not be bypassed in 6(1.1%) patients. URS went in to false passage with insignificant perforation in 13 (2.4%) patients. There was laceration or minimal perforation in the ureter with guide wire at the site of impacted ureteral stone in 50 (9.25%) patients. No open surgical intervention was required for these patients.

**Table:-3:  
Causes of failure of the procedure and type of secondary procedure done.**

Causes	No. of Patients	Secondary procedure	No. of Patients
Upward stone migration	31(5.73%)	DJ+ESWL	All
Stone fragment failure	13(2.40%)	ESWL	All
URS insertion	06(1.11%)	ESWL+/ Exploration	All
Ureteric Perforation	01(0.185%)	DJ+ Redo later	All

The ureter was avulsed in 1 (0.18%) patient. Ureteroneocystostomy with Boary's flap was done in this case. There was obstruction at pelviureteric junction due to stone in 41 (7.58%) patients. These were fragmented but fragments went up inadvertently. DJ stenting was done in all the above cases having any complication or in case of failure in stone fragmentation and removal.

**Table:-4:  
Complications of the Procedure and any other Secondary Procedure.**

Complications	No. of Patients	Secondary procedure	No. of Patients
Haematuria	272(50.32%)	Conservative	All
Mucosal Lacerations	50(9.25%)	DJ Insertion	All
Perforation	13(2.40%)	DJ Insertion	All
Ureteric Avulsion	1(0.18%)	Open Surgical Repair	All

## DISCUSSION

Stones in the ureter are managed with as minimal invasive procedure as possible. Stone fragmentation through URS and ESWL are the

frequently used procedures for the ureteric stones[3,4]. ESWL is no doubt a non invasive procedure but there are many factors like site, size and composition of the stone, degree of impaction in the ureteric walls, presence of bones and bowel loops intervening between the stone and the Lithotripter, obesity, other causes of ureteric obstruction like stricture, which reduces the efficacy of ESWL[6]. Bilateral ESWL in one sitting is not advised while bilateral URS is feasible in one sitting [7]. This has further promoted the role of URS in the fragmentation of the ureteric stones.

Fasihuddin Q and Hasan AT treated 125 patients with ureteroscopy. Among them, 73.7% were male and 26.3% were female There was technical failure to negotiate through the ureteric orifice in 8% of the patients. In 118 patients in which there was successful introduction of ureterorenoscope, there were stones in the upper ureter in 4%, in the middle ureter in 13.2% and in lower ureter in 82.6%. Stone clearance rate was 93.8%. Stricture was found in 4% patients. Stripping of mucosa occurred in 2.5% patients[15].

Mugiya et al in 2006 treated 54 patients with ureteric stones having diameter average 15.2 mm with small diameter ureterorenoscopy. He was successful in fragmenting the ureteric stones in 87% patients by a single endoscopic procedure. No complication was recorded in any case [9].

Sanallah et al in 2003 studied 30 patients with ureteric stones. Fragmentation of ureteric stones was completed with Ureteroscope in 95% of the patients [16]. Toufique and Bagley did 100% stone clearance in 29% proximal, 19% mid and 52% distal ureteric stones in 210 patients [17]. Park et al did retrograde endoscopic stone clearance in 87.8% of patients. He observed 83.6% and 42.1% stone clearance rate with ESWL in case of stone size less than 1cm and more than 1cm respectively [6].

Alapont et al in 2003 did ureteroscopy in 4645 patients for different causes of ureteric obstruction. He did this procedure under mild sedation and on outpatient basis in 53.9% cases, remaining 46.1% cases were done under general anesthesia. There was ureteral avulsion in 3 cases. We did ureterorenoscopy in 35% patients under mild sedation and analgesia [18].

Bapat SS et al compared the success rates and complications of Lithoclast and holmium laser assisted ureteroscopy URS in managing upper ureteral stones in 394 patients. They concluded that the fragmentation

rates of holmium laser assisted ureterorenoscopy were better in upper ureter [8].

Saltzman B. recommended stenting in patients following ureterorenoscopic stone therapy; when stone fragments were multiple and or bigger one[11].

Our study revealed 89% stone clearance rate in the ureter at all levels in the total 540 patients. It was 94.73 % clearance in the 209 lower ureteric stones, 95.11% in 266 mid ureteric and 44.61% in the 65 upper ureteric stones. The clearance rate was 98.21% in the stone size <1cm, 85.1% in stone size 1-2 cm and 52.56% in the stone size of 2-3 cm. Upward stone migration in 7.37% patients was the major cause of failure of the procedure. Dretler SP addressed this issue and revealed promising results in his study[19]. Ureteric avulsion was present in 0.18% of 540 patients which was corrected by Ureteroneocystostomy. Other complications were minor and were corrected by conservative treatment or double J insertion. Ureteric stenting were done in 78.81% of 540 patients. So transurethral ureteroscopy should be the preferred method to approach and fragment the ureteric stones. Anyhow, the flexible Ureteroscope is a better option as compared to rigid one. The cost and early wear and tear of flexible URS limits its role in an economically poor society like ours. The results of this study using rigid URS with Pneumatic Lithoclast were equally good when they were compared with international studies in the literature.

## CONCLUSION

In a country like Pakistan having limited financial resources, transurethral rigid Ureteroscopy URS along with Lithoclast is still an acceptable procedure for the stones of different sizes and at different levels in the ureter. One should be very careful in manipulating URS to avoid upward migration of the stones in the renal pelvis and to avoid other iatrogenic complications.. Ureteric stenting should be preferred to prevent the ureteric obstruction due to stienstrasse especially in bigger and multiple stone fragments.

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