# URETERORENOSCOPY AND PNEUMATIC LITHOTRIPSY IN THE MANAGEMENT OF URETERAL CALCULUS

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**Abstract**

To report our experience of ureterorenoscopy (URS), we reported 200 cases of ureteric stone (male-136, female-65, age varied between 14-66 yrs) treated by 8.5 FR Olympus URS done under spinal anaesthesia. The mean stone size was 10.5 ± 4.5 mm and stone clearance rate was 93%.Mean operation time was 40-60 minutes.Stone disintegration was done by pneumatic lithtriptor which was found user friendly and effective. There were no per-operative complications and only few minor post-operative complications but three patients had gram negative septic shock which were treated effectively. So URS and pneumatic lithotripsy is proved to be an effective tool for treating ureteric stones.

**Key words:** ureterorenoscopy; pneumatic lithotripsy; ureteric stone; spinal anaesthesia.

## Introduction

Uretero-lithiasis can cause a greater or lesser degree of obstruction of the ureter, depending on the size of the calculus, urothelial oedema and the degree of impaction, requiring instrumental treatment, sometimes as an urgent procedure. In the past 25 years, the treatment of these calculi has evolved from ureterolithotomy to ureterorenoscopy (URS)[1] and extracorporeal shockwave lithotripsy (ESWL)[2], but the optimal treatment for these stones remain controversial. Extracorporeal Shock Wave Lithotripsy (ESWL) is the least invasive and commonly adopted treatment option. However, ESWL has a variable low success rate particularly for large impacted stones and is not available in all over the country. Flexible ureteroscopes combined with refined techniques of intracoporeal lithotripsy have improved the management of upper tract stones but it is expensive. For both treatment modalities stone-free rates of more than 90% have been reported[3,4,5]. This study presents our experience in treating ureteric stones at different levels using a rigid ureteroscope and pneumatic lithotripsy.

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## Materials and methods

A total of 200 patients underwent URS for ureteral calculi between March2006 to December 2007 were entered into the study. Patients presented with radiodense ureteral stones larger than 1 cm, at any level below pelvi-ureteric junction on excretory urogram were advised for therapy. Stones smaller than 1 cm which had not passed within 3 weeks with expectant therapy were also advised for URS. Ureteric obstruction on IVU without radio opaque stone but stone found at URS were also included in the study. In all cases, the procedure was done under spinal anesthesia with rigid 8.5 FR Olympus ureteroscope without dilation of ureteric orifice. In most of the cases the stones were disintegrated with the Pneumatic lithotripsy lithotripter and cleared with grasper and in few cases of small stones were extracted with grasper only. In cases of upper ureteric floating stones it was grasped with dormia and disintegrated with the Pneumatic lithotripsy lithotripter. Ureteric stents were placed in cases where there was gross mucosal oedema or the stone burden was higher and all the fragments were not cleared. All patients were administered prophylactic antibiotic. Per-operative difficulties and complications were noted. Post-operative complications and convalescence were recorded. After about one month of the procedure, a plain X-ray was taken in doubtful cases and the stent was removed.

## Results

Two hundred patients were treated with URS. Among them 135 cases were male and 65 were female. Patient's age varied between 14 and 66 years with maximum number of patients between 35 to 45 years of age. The mean stone size was 10.5 ± 4.5 mm (range 6 to 27). All patients were treated as an inpatients procedure and the procedure was done under spinal anaesthesia in all cases except in one where general anaesthesia was given for opposite sided pyelolithotomy at same sitting. Successful manipulation for stone clearance was achieved in 186 (93%) cases. Of these, intracorporeal pneumatic lithotripsy was used in 176 cases for stone disintegration and in 10 cases the stone was removed

by grasper only. In 5 cases of upper ureteric stone, the stone migrated up in the pelvis either during introduction of scope or during lithotripsy. In 6 cases we could not reach up to the stone either due to narrowing of the ureter or severe oedema below the impacted stone and in three cases we failed to negotiate the guide wire and or the scope as well through the ureteric orifice due to edematous orifice or angulated ureter. DJ stent was used in most of the cases (94%) which was removed after 3 weeks and onwards using local anaesthetic jell. The median operation time was 40-60 minutes. No major per-operative complications were encountered. Oral pain medication was used in 86% of the patients for 1.4 ± 1.5 days. Post-operatively 3 patients developed gram negative septic shock in the earlier part of the series which was effectively treated by parenteral antibiotics and steroids. 23 (46%) patients developed high fever which was also treated with appropriate antibiotics. Average hospital stay was 1.5±2 (range 1-4) days. Mild haematuria was observed in 86% cases for first 24 hours which does not require treatment. Long term post operative complications could not be evaluated due to lack of follow up

**Discussion**

URS has been an effective therapeutic addition to the urologist's armamentarium to treat ureteric stones. Ureteric stones cause a great morbidity (obstruction of the ureter and hydronephrosis) but they have a high probability of spontaneous clearance. Spontaneous passage should be favored if possible[6,7]. According to a meta-analysis by the AUA Guidelines Panel, newly diagnosed stones with a diameter <5 mm will pass in up to 98%, depending on the degree of obstruction, urothelial edema and degree of impaction6. With close controls and in absence of risk factors like impaired renal function, pain, urinary tract infection or fever, these stones can be followed safely until spontaneously cleared. However, most authors recommend not exceeding 4-6 weeks, especially for obstructive ureteric calculi[8,9]. These data show that the success rate is strongly influenced by the timing of therapeutic intervention[4]. The sooner the therapy is initiated, the more stones that might have passed spontaneously will be treated and, thus, false results in favor of the chosen procedure will be obtained. In particular small stones have a high spontaneous passage rate and so therapeutic intervention should be delayed to allow clearance[4]. For this reason treatment was delayed in our study until 3 weeks after the diagnosis of a ureteral stone less than 1 cm in size unless earlier therapeutic intervention was mandatory because of recurrent colic.

All the cases in our series were treated as inpatient procedure because of lack of transport facility and social reasons. But from a retrospective review of planned same-day discharge after ureteroscopy in 114 patients, Wills and Burns10 concluded that ureteroscopy should be considered an outpatient procedure. They also reported a 24% immediate admission rate, with about half the admissions for "social" reasons. The procedure can safely be performed under spinal anesthesia as we did but Ibragim et al11 described an important disadvantage of URS is that the procedure has to be performed under general anesthesia. There are some other reports where they described that URS can even be performed under local anesthesia combined with intravenous sedation[12,13].

Peschel et al.[4] recommended URS as first-line treatment for smaller stones (<5 mm) that do not pass spontaneously. In our series patient with stone size more than 1 cm in any place below pelviureteric junction underwent URS and we find a success rate of 93%. Treatment success must also consider secondary outcome parameters, such as complication rate, patient satisfaction, procedural efficacy and cost. Complication rate is low in our series. In neither the series of Pearle et al.[7] nor Peschel et al.[9] did ureteral perforation or stricture occurred in their treatment group. However, ureteral injury is an established, albeit rare, complication of URS.

However, the invasiveness of ureteroscopy cannot be neglected. Before the emergence of modern techniques for stone fragmentation and newer, better-designed ureteroscopes, complications like ureteric perforation and avulsion were not uncommon. Though none happened in our series. A comprehensive review of acute endoscopic injuries reported in the literature from 1984 to 1992 identified 314 ureteric perforations that occurred in 5117 procedures (6.1%) and complete ureteric avulsion in another 17 procedures, though infrequent, were documented (0.3%)[14]. Harmon et al.[15] observed a decrease in overall complications from 20% to 12% during a 10-year period which were attributed to smaller ureteroscopes and increased surgeon's experience. Schuster et al.[16] suggested a significant reduction in ureteric

perforation with a less operative time and postoperative complications with the surgeon's experience. Similarly P Dasgupta et al[17] reported higher complication rate in older series where 9.8-F to 10.8-F scopes were used probably because of the larger diameters of the instruments. We used 8.5 FR Olympus scope and without dilatation of ureteric orifice in all cases. Other complications such as a failed procedure, pyelonephritis, gram negative septic shock were also noted in our series which were comparable with other study.

Proximal migration of stones occurred in 5 patients with upper ureteric stone (2.5%), which is less than what had been reported[13,14]. With the emergence of flexible ureteroscopes, migrated stones could be retrieved with basket or it can be fragmented even in the renal collecting system. We used semi-rigid ureteroscopes for all ureteric calculi.

Routine placement of ureteral stent after ureteroscopic stone has been considered the standard care in most centers but Denstedt et al.[18] performed a prospective trial of non-stented versus stented ureteroscopic lithotripsy, and concluded that patients without a stent have significantly fewer symptoms in the early post-operative period, while there were no differences in terms of complications and stone free status. In our study, D-J stent was used in most of the patients (94%) and our observation is that most patients with DJ stent in situ complain of loin pain and haematuria. Ibrahim et al do not believe that routine placement of a ureteral stent following uncomplicated URS for a distal ureteral calculus is necessary.

We used pneumatic lithotripsy in all cases where stone fragmentation were needed (176 cases) and we found very comfortable and good fragmenting capacity. But the only difficulty with pneumatic machine is stone clearance particularly where stone burden is high. These data are comparable to other retrospective series[17,19] although the stone clearance rate is somewhat lower than that reported with the use of a Holmium laser[20].

**Conclusions**

Our prospective experience of ureterorenoscopy has shown it to be a valuable tool in the treatment of ureteric stones which reaches immediate high stone free rates. It has a low complication rate and requires short in-patient stay. In our experience pneumatic lithotripter is cheap, more user friendly and had a good success rate but the use of Holmium laser and or ultrasonic lithotripter may improve stone fragmentation and clearance rates.

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