

## Role of Retroperitoneal Laproscopic Surgery in Ureteric Calculus- An Experience from Bundelkhand Region

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### Abstract

**Background:** Urolithiasis is the aggregation of crystals in the urine, most commonly composed of calcium oxalate. Laparoscopic procedures have higher stone clearance in comparison of ESWL, URS and PCNL.

**Aims and objective:** The aim of the current study was to analyze the feasibility of laparoscopic retroperitoneal surgery for management of urolithiasis and to investigate that the minimal invasive surgery is an alternative technique in current era of endoscopic procedure.

**Materials and Methods:** A total of 52 patients with urolithiasis were enrolled and all were treated with laparoscopy. All stones were taken out after ureterotomy without fragmenting the stone.

**Results:** 28 were male and 24 were female patients from 52 enrolled patients. Patient's age was  $31.4 \pm 29.81$  years of age. Out of 52 patients 28 had stone on right side and 24 were from left side. Size of the stone  $16.2 \pm 11.11$  mm. Total operation time was  $48 \pm 19.08$  min. Procedure was performed usually with 3 ports. Post-operative stay was 3 to 9 days. Proximal migration of stone, urinary leakage, ureteric stricture and conversion to open surgery were complications found during the study.

**Conclusion:** Laparoscopic retroperitoneal surgery for urolithiasis is a safe and good alternative for open surgical procedure and can be performed at primary healthcare units.

**Keywords:** Urolithiasis; Laparoscopic; Ureteroscopy; Endourology; Surgery

### Introduction

Urolithiasis is a very common disease and the management of ureteral calculi has been changing day by day [1].

The formation of calculi in the upper urinary tract is a problem that places a considerable burden on primary care physicians. The lifetime incidence of urolithiasis is up to 15% in males and 8% in females, with a yearly incidence of roughly 131 per 100,000. The lifetime recurrence rate in patients with known urolithiasis approaches 50%. Many of these patients present first to general practitioners (GPs), and often require investigation [2].

"I will not cut for stone, even for patients in whom the disease is manifest; I will leave this operation to be performed by practitioners, specialists in this art." This classic reference, a part of the Hippocratic oath, is one of the first to detail the inherent challenges of surgical treatment of urolithiasis; however, historical accounts of open lithotomy date back to 276 BC, when the Greek surgeon Ammonius of Alexandria coined the term lithotomy in his description of "cutting for stone" to aid its removal [3].

Fortunately, the modern era has essentially abolished the need for open stone surgery in areas with adequate technology and resources [3].

Open surgery is more painful, time consuming, required more hospitalization, chances of infection and more morbid.

Management of urolithiasis is changing from open surgery to extracorporeal shock wave lithotripsy (ESWL) ureteroscopic lithotripsy and stone removal (URS), percutaneous nephrolithotomy (PCNL) and Retrograde Intra Renal Surgery (RIRS) [3].

There is a specific area of urologic surgery in which laparoscopic application has expanded. The retroperitoneal approach affords the potential advantage of decreased visceral and vascular injuries as well as lower incidence of postoperative ileus which extends all the benefit of minimally invasive surgery.

Laparoscopic procedures are conceptually more similar to open surgical methods than to minimally invasive techniques, but accomplish their goals with smaller incisions, less direct tissue manipulation and a potentially faster recovery time than open surgery [3].

Laparoscopic approach is often accepted as an ultimate means for large and complicated stones. It is a novel option for the replacement of conventional open procedure. It has less morbidity, better analgesia, less hospital stay, better cosmesis and early recovery. The advantage of this technique is that it can be performed with same laparoscopic instruments used in laparoscopic cholecystectomy which are easily available in majority of primary care hospitals.

Laparoscopic procedure have higher stone clearance in comparison of ESWL, URS and PCNL. Moreover to that, Laparoscopic method removes the stone in a single piece and that gives a lot of assurance to the patient and his attendants [4].

The aim of the current study was to analyze the laparoscopic retroperitoneal surgery for management for ureteric stone in Bundelkhand region of central India.

## Materials and Methods

Study was conducted in the Department of surgery, St. Jude's Hospital and GRD Hospital, Bundelkhand Laparoscopic Surgery Centre, Jhansi, India.

Consent was obtained prior to patient enrollment.

Total 52 patients were enrolled from October 2008 to December 2014.

Gender, Age, Side of stone, Site of stone, and Size of stone, Operative time, Blood loss, Post-operative stay and complications were recorded for patient retrospectively.

All patients were undergone Routine blood investigations, Plain X-Ray KUB (Figure 1), Intravenous pyelogram (IVP), Sonography and CT intravenous urogram (IVU) (In Some Patients) before surgery.



**Figure 1:** Operative photograph of ureteric stone X-ray KUB showing left upper ureteric calculus.

For confirmation of diagnosis by imaging, plain X-ray KUB and Ultrasound was performed in each patient. IVP was also done before planned surgery. CT IUUV was carried out for few patients.

Patients with stone size >1.2 cm and in upper ureter i.e. upto the pelvic brim were taken for laparoscopic ureterolithotomy [5]. All stones were taken out after ureterotomy without fragmenting the stone.

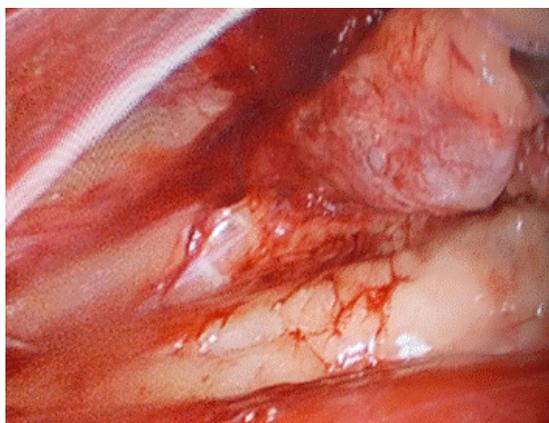
Patient of ureteric stone were kept in full lateral decubitus position with hyperextension position side of stone upper side after giving spinal anesthesia. A 1.5 cm incision was given midway from sub-costal margin and ileac crest in mid axillary line. Facial lumbodorsalis was opened with an artery forceps. Space was created with finger dissection and balloon dissection. A Hassan's cannula was fixed in this port to be used for camera. Two 5 mm ports were created anterior and lateral to this 10 mm port with finger guidance's for working port. Anterior margin of PSOS muscle was followed to trace the ureter usually lying at the medial and upper margin of it. Stone was identified with the bulge in the ureter and a linear incision was given over the stone with cold

knife. Stone is retrieved and an infant feeding tube was passed to confirm the distal patency of the ureter. Upper end of the tube was placed in the proximal ureter which works as stent. Ports were closed after placing a drain in the created retroperitoneal space (Figures 2-9).

All the procedure were performed by conventional three ports or one additional 3 or 5 mm port in difficult patients due to infected or adhered operative field in lateral position with side of stone on upper side.



**Figure 2:** Retroperitoneal Dissection to Locate the Ureter.



**Figure 3:** Ureter with Stone PSOS muscle as Landmark.

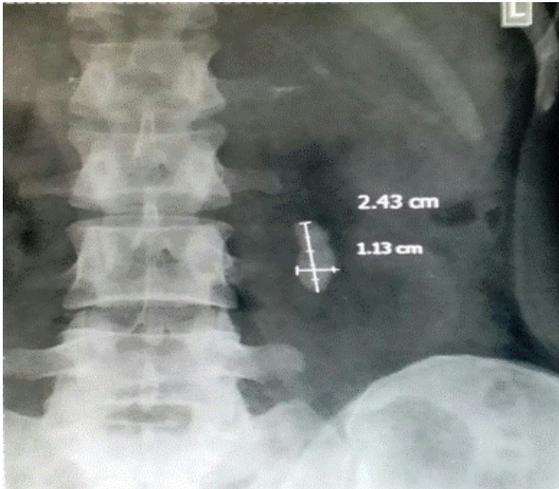


Figure 4: Left Ureteric Calculus.



Figure 7: Stone in Ureter.

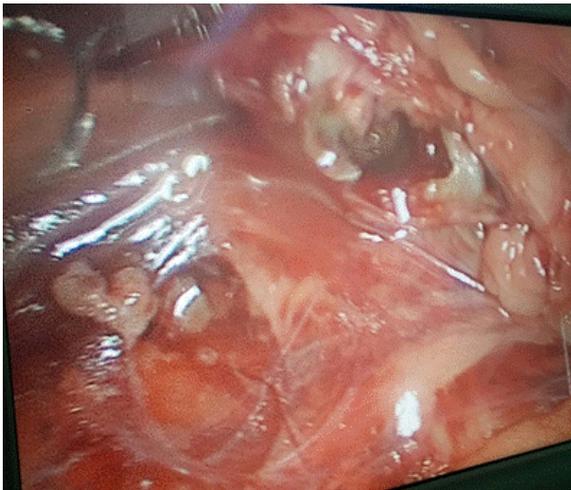


Figure 5: After Ureterotomy with Cold Knife.



Figure 8: Port placement in Laparoscopic Reteroperitoneal Ureterolithotomy.

Site of additional port was determined with site of stone in ureter. Anterior border of psoas muscle was used as landmark and ureter was located around the medial border of psoas muscle.



Figure 6: Stone Retrieved from Patient.



Figure 9: Post-operative status- One 10 mm and two 5 mm ports.

Impacted stone in the ureter was identified by bulge in the ureter and proximal dilatation of ureter or sometimes adhered fat around it due to presence of infection. Ureter was opened with longitudinal incision either with cold knife or J laparoscopic hook and stone was

extracted in total without fragmenting with the help of atraumatic grasper. An infant feeding tube was passed through the opening in ureter or pelvis instead of D-J stent as it does not need imaging for confirmation of distal end in bladder and can confirm simply by aspirating and it serves the purpose. A retroperitoneal drain was kept which was removed when drain was less than 50 ml (usually 3rd or 4th POD).

Infant feeding tube was used as it can be easily passed in distal and proximal ureter. The distal end in bladder can be confirmed simply by aspiration. There is no need of any imaging required. The proximal end can be negotiated easily in the proximal ureter. The only drawback found is that it can migrate easily that cause persistent leakage which can be easily managed by putting a D-J stent [6].

A plain X-ray KUB was performed before discharge of patient from the hospital. If no residual stone was seen, then patient was discharge and patients were followed up for 18 months. During follow up of all patient, only one patients showed recurrence which was 6 mm UVI stone and it was managed with URS.

Patients were also prefer this procedure as stone did not fragment during this procedure and removed out in single piece. This procedure can be performed with same laparoscopic instruments used in laproscopic cholecystectomy which are easily available in primary care units [7]. No imaging is required for the procedure. No need of costly and fragile endourology instruments were required.

## Results and Discussion

Mean size of the stone in this study was observed 16.2 mm (12 mm to 33 mm). Similar type of results were found by Qingfeng Hu et al. [2] where mean size of stone was 22 mm (14 mm to 35 mm). Mean size of stone was found 18.1 mm (10 mm to 25 mm) by BC Jeong at al.7 Mean size of stone was found 20.12 mm (12 mm to 30 mm) by H Ercil at al. [8] Size of stone from patients enrolled in different studies by [2,3] and H Ercil at al. was found nearly similar to current study (Table 1). Therefore, it has been considered not any major difference in correlating data with other studies.

Parameter	Data
Sex	Male-28, Female-24
Age (Years)	31.4 ± 29.81 (15 to 74)
Size of stone (mm)	16.2 ± 11.11 (12 to 33)
Mean operative time (Min)	48 ± 19.08 (32 to 70)
Post-operative stay (Days)	3.8 ± 3.26 (3 to 9)
Location of stone	Upper ureter (All patients)
Side of Stone	Right-28, Left-24
No. of ports	Three: One- 10 mm and two 5 mm
Additional port	One either 3 or 5 mm port in 7 cases due to difficult operative
Complications	Proximal migration of stone: 2/52,
	Persistent urinary leakage (more than 5 days): 7/52
	Post-operative ureteric stricture: 1/52
	Conversion to open procedure due to failure to identify the ureter: 2/52

**Table 1:** Patient Characteristics.

Mean operative time for this study was found 48 min (32 to 70 min) whereas in study by Qingfeng Hu, et al. [2] mean operative time for the operation by similar method was 87 min. As per table presented by Rajiv Y, et al. [6], mean operative time for laparoscopic ureterolithotomy was vary from 61 min, 90 min, 105 min, 79 min and 67 min [6]. In this data, it was observed that retroperitoneal laparoscopic surgery is an effective and safe procedure, offering a short learning curve and shortening of the operation time with increased experience.

In this study 3 port (one 10 mm and two 5 mm) were used. In 7 patients, due to difficult operation field, one additional either 3 mm or 5 mm port were used. Similarly, 4 ports were used in article by Rajiv et al. 6 3 to 5 ports were used by H Erlic et al. [8] Generally, from 3 to 6 ports were required for laparoscopic surgery. It has been proven that

the risk of bleeding, organ damage, herniation, and cosmetic concerns increases with the increase in the number of ports.

In current study, mean post-operative stay at hospital was found 3.8 days (3 to 9 days) and similar results were found with Qingfeng Hu et al. [2] where mean post-operative stay was 3.6 days. The mean hospital stay was 7.12 ± 4.47 (3–22) days and 4.04 ± 2.05 (2–12) days for Groups A (the first 25 cases) and B (the last 25 cases), respectively in study by H Erlic et al. [8] The mean hospital stay in study by SJF Qadri et al. [9] was 2.8 (2–13) days. Shorter the hospitalization more beneficial to patient which has been observed in current study.

Complications observed in patients post-discharge for current study were proximal migration of stone, persistent urinary leakage, post-operative ureteric stricture and conversion to open procedure due to failure to identify the ureter. In proximal migration of stone, patient

head end was raised; frusamide was given and stone milked out. In one of the case pyolithotomy was performed to take out the stone. In persistent leakage, the position of infant feeding tube was evaluated, if migrated, it was taken out and D-J stent was placed which stopped the leakage. For the complication stricture, open repair of stricture was performed. Complications like stone migration, urine leak, and ureteral stricture were also observed by Qingfeng Hu et al. [2] Complications observed in study by H Ercil et al. [8] includes stone migration, prolonged urinary drainage, ureteral stricture and retroperitoneal stone expulsion. According to Kumar et al. [10] 3.5% of the patients had a major complication, including seven vascular injuries, five of which required immediate conversion to open surgery. Four patients (1.2%) had other major complications including colonic injury, retroperitoneal collections and incisional hernia. There were 50 minor complications (15.8%) of which peritoneal tears (17) were the commonest. Port-site infections and subcutaneous emphysema contributed 2.2% each.

There are inherent advantages of retroperitoneal laparoscopy access over open surgery as well as trans-peritoneal laparoscopy. Retroperitoneal laparoscopy has become standardized and is now safe and reproducible. Most complications are minor and easily managed, especially if there is low threshold for conversion to open surgery during the initial phase of learning. It can be performed with commonly available laparoscopic instruments and there is no need of expensive endourology equipment. It has a better stone clearance, less complications and nephron preserving procedure. It is highly suitable in patients having large stone, complications in stones and even in failed ESWL or endourology attempt.

## Conclusion

Laparoscopic retroperitoneal surgery is a safe and good alternative for open surgical procedure.

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