Laparoscopic Transperitoneal Ureterolithotomy

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ABSTRACT

Objective — *To determine the outcome of trans-peritoneal laparoscopic ureterolithomy in difficult and large ureteric calculi and evulate the safety and efficacy of this procedure.*

Study design — *Descriptive case series*

Place & Duration of study — *Urology Department, Jinnah Postgraduate Medical Center Karachi, from January 2012 to December 2017.*

Methodology — *Patients with impacted ureteral calculi of more than 15 mm size, those with the history of failed ESWL or URS were included. Exclusion criteria was patients who had associated COPD and previous abdominal surgeries. The preoperative evaluation included a detailed history, complete blood count, urine culture, renal function profile, coagulation profile and CT-KUB. All procedures were performed through trans-peritoneal route using three port technique in modified lateral position. Antegrade Double J stent was placed where needed. Intraoperative and postoperative complications were noted. Data were analyzed using Statistical Package for the Social Sciences (SPSS, version 20).*

Results — *Sixty patients were included in the study. The mean age of the patient was 36.65+ 12.41 year (from 15 - 76 year). Right sided calculi were 37 (61.6%) and left sided 23 (38.3%). In 42 (70%) patients calculi were in proximal ureter, 8 (13.3%) in mid ureter and 10 (16.6%) in distal ureter. Calculus size was from 15 mm to 30 mm and the mean calculus size was 18.2+ 2.56 mm. The mean operation time was 99.38+ 22.32* minutes *whereas the mean blood loss was 27.35+ 9.9 ml. Stent was placed in 48 (80%) patients while remaining 12 (20%) patients did well without stent. Stone clearance rate was 100%. Overall complication rate was 20%, that included partial ureteric injury, postoperative fever, paralytic ileus and ureteric stricture.*

Conclusions — *Laparoscopic ureterolithotomy was found safe, minimal invasive and effective modality for treating ureteric calculi as a primary procedure or salvage procedure after failed ESWL and URS.*

Key words — *Laparoscopy, Ureterolithotomy, Trans peritoneal, Ureteric calculus.*

INTRODUCTION:

Urolithiasis is a common and recurrent disease which require substantial expenses for its treatment.[1] Upper ureteric calculi, especially those which are relatively big and impacted, have been a practical challenge for endo-urologist, since the major open urological surgery has been shifted to endourology. Previously three treatment modalities namely, ureteroscopy with lithoclast (URS-LC), extracorporeal shock wave lithotripsy (ESWL) and open surgery have been used.

At ureterorenoscopy (URS) impacted and bigger upper ureteric calculi cannot be pushed back easily for PCNL. The attempts at this could result in ureteric injury, further complicating the management. If only URS and in-situ lithotripsy in planned; stone or its fragments could migrate proximally, requiring additional procedures. Further more extreme maneuvering with ureteroscope could damage the

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instrument and at times even it is difficult to reach the calculus due to ureteric kink. Failed URS along with ureter injury could lead to septicemia especially in patients with diabetes mellitus. Patients with single functioning kidney are at greater risk of developing renal failure with complicated URS. The stone clearance rate with URS- lithoclast is reported as between 60-90%.[2,3]

The extracorporeal shock wave lithotripsy is particularly suitable for upper ureteric calculi rather than lower one. But the success rate of ESWL with impacted proximal ureteric calculi with size exceeding 1 cm, is from 84 to 42%.[4] The larger calculi may require prior stenting before ESWL, which require anesthesia for Double J stent placement. ESWL could be painful procedure. The proximal calculus localization needs the help of fluoroscope rather than simple ultrasound, adding risk of radiation. ESWL could fail even after multiple sessions. The possible steinstresse may need URS-lithoclast.

Open surgery has the advantage of high success rate in one session but at the cost of increased hospital stay, analgesia requirement and long ugly scar.[5] Laparoscopic ureterolithotomy (LU) is an another management option, with success rate similar to that of open surgery, but superior to it in terms of reduced analgesic requirement, early recovery, short hospital stay and better cosmetic outcome.[6,7] The purpose of this study was to analyze the results of laparoscopic ureterolithomy performed in our department in patients with ureteral calculi.

METHODOLOGY:

This was a descriptive case series conducted in the Department of Urology, Jinnah Postgraduate Medical Centre, Karachi. We analyzed the data of 60 patients who underwent LUs for ureteric calculi from January 2012 to December 2017 with minimum of one year follow-up, till December 2018. The inclusion criteria was calculus size of more than 15 mm in diameter, history of failed ESWL or URS. Exclusion criteria were patients with associated diseases like COPD, previous abdominal surgeries and cases converted to open.

The preoperative evaluation included a detailed history, complete blood count, urine culture, renal function tests, coagulation profile and CT-KUB. All procedures were performed through trans-peritoneal route in modified lateral flank position. Port sites were; anterior axillary line just below costal margin, camera port was placed 6 cms lateral to umbilicus and third port was placed at the centre of line joining anterior superior iliac spine and umbilicus. Peritoneal access was achieved using both open and Verees needle puncture. Gas pressure was kept between 15-16 mm Hg. Colon was mobilized following the white line of Toldt to expose the proximal ureter. Stone hump was identified and confirmed by touching with Maryland grasper. No specific method was used to prevent proximal stone migration as it was not deemed necessary. Ureter incision was made with diathermy using cutting mode, and proximal part of calculus was delivered first to avoid migration. Antegrade Double J stent was placed in most of the cases. Ureterotomy incision was closed with interrupted suturing. Drain placed in all cases.

Intraoperative and postoperative complications were noted and recorded. Follow up for residual calclus if any, was done with CT-KUB in early postoperative period. IVP was performed after 6 months to rule out possible ureteric stricture in cases of impacted calculus. Data were analyzed using Statistical Package for the Social Sciences (SPSS, version 20). For categorical variables, frequency and percentage were used and for continuous variables mean + SD was calculated.

RESULTS:

Total number of patients included in this study was 66. In six patients procedure was converted to open. These cases are excluded from analysis. Finally 60 patients formed the cohort for this study in whom successful removal of calculus was performed. Mean age of the patients was 36.65+ 12.41 year (from 15 year to 76 year). There were 35 (58.3%) males and 25 (41.6%) females. Thirty-seven (61.6%) calculi were on right side and 23 (38.3%) on left side. Forty-two (70%) calculi were in proximal ureter, 8 (13.3%) in mid ureter and 10 (16.6%) in distal ureter. Fifty-seven (95%) cases were primary and only three (5%) were after falied URS. In all three cases there was failure of access because of kinking of ureter.

Calculus size varied from 15 mm to 30 mm with mean size of 18.2+ 2.5 mm. The mean operation time was 99.38+ 22.32 minutes. Mean blood loss was 27.38+ 9.78 ml. Stenting was done in 48 patients. Double J stent was placed in 38 (79.1%) patients while in remaining 10 (20.8%) patients open end ureteric catheter was placed. No stent was placed in 12 patients (20%) without any documented increase in complication rate.

Intraoperatively in one patient with marked ureteric adhesions, partial ureteric injury occurred which was repaired after calculus removal and Double-J stent placement. This patient recovered uneventfully. In two patients with proximal ureteric calculus, proximal

Table I: Postoperative Complications		
Complications	**Number of patients (n)**	**Percentage**
Partial Ureteric Injury	01	1.6
Postoperative Fever	06	10
Paralytic Ileus	03	5
Port Site Infection	02	3.3
Ureteric Stricture	01	1.6

migration occurred during ureteric mobilization. One was managed with open pyelolithotomy in same anaesthsia while in other patient PCNL was performed as second procedure. As a drain was placed in all our patients with mean drain output of 20.16+ 18.34 ml. Prolonged urinary drainage was not observed in any patient. Postoperative fever was noted in six patients. Paralytic ileus was observed in three patients that required nasogastric tube placement while port site wound infection seen in two patients requiring wound dressing. None of our patients needed blood transfusion.

Mean length of hospital stay was 2.56 +0.9 days. Calculus free rate was 100% which was confirmed with postoperative CT pyelogram in all patients. Follow-up IVP was performed in patients with impacted ureteric calculi with difficult extraction. One patient needed temporary DJ stenting due to postoperative ureteric narrowing (stricture) six months after surgery (table I).

DISCUSSION:

The treatment option for ureteric calculi has evolved in recent decades. The ultimate objectives are good calculus clearance, minimal invasive and minimal procedure related complications. The ESWL is the least invasive but having poor success rate especially with large multiple calculi of high Hounse Field Unit (Hard Stone).[4] The use of URS and lithoclast is limited by low clearance rate and high complication rates, especially in patients with ureteric narrowing, acute kinks and proximal mobile ureter. An overall complication rate after URS is about 25%.[8] Proximal location and stone impaction are common factors predicting unfavorable results.[9] Although the complication rates of our study is also 20% but these were mild and easily manageable as compared to major complications of URS, such as ureteric perforation and avulsion requiring major intervention.

Ureterolithotomy has its place in the treatment of ureteral calculi. The laparoscopic ureterolithotomy is increasingly replacing open surgery now a days and considered as a minimal invasive approach. LU has the highest calculus free rates (CFR) as compared to ESWL and URS for proximal ureteric calculi.[10] KO et al compared LU with URS and lithoclast and found that CFR after a single session to be significantly high in LU group (93% vs. 68%).[11] Neto et al came with similar results after comparing the results of LU, ESWL, URS and found the CFR 93%, 35% and 62% respectively.[3,12] Most studies in literature revealed the calculi free rate (CFR),also called as success rate, between 90-98% but there are reports of 100% as well.[13,14] Our result of CFR is also 100%. This may be because of our patients selection. None of our patients were post-ESWL, so no prior stone fragmentation found and it was easy to remove stone completely that minimized the chances of residual stone.

Ureteric stenting after stone removal is a debatable issue. Karami et al reported that DJ placement significantly decrease complications rates without increasing operative time.[15] Hammady et al also recommended the advantage of DJ stent.[16] But Kijvikai and Patcharatrakul recommended stenting only in cases with prolonged impacted stone and in patients where ureteric suturing is difficult due to chronic inflammation of ureteric wall.[17] We did not place stent in 20% patients without documented increase in drain output or any other complication.

Among the late complications, ureteric stricture with hydronephrosis is a major complication in other studies. In the review by Nouira et al the ureteric stricture rate was found to be 2.5%.[18] Nouria et al recommended cold knife incision to prevent ureteric stricture. Gaur et al indicated that ureteric incision with an electrical hook in cutting mode is easier and safe method.[19] Harewood et al also favour the use of diathermy hook.[20] We also used diathermy hook in cutting mode to open the ureter and got satistactory results. In present study one (1.6%) patient developed ureteric stricture who presented 4 months after surgery. He needed further DJ stenting for six weeks and became symptom free.

Second important factor is the method of ureterotomy incision closure. Too tight closure may create

ischemia on the wall resulting in ureteric stricture.[18] Not closing the ureter or loose closure may lead to prolonged urinary leakage which result in retropertioneal fibrosis and ureteric stricture.[21] Proper closure with at least approximation of mucosal edge may be useful in difficult ureterotomy incision closure.[22]

CONCLUSIONS:

Laparoscopic ureterolithotomy was found safe and effective modality for treating ureteric calculi as a primary procedure or salvage procedure with minimal complications.

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