

## Original Research

### Laparoscopic Ureterolithotomy: Analysis at a Peripheral Military Hospital Hospital

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#### ABSTRACT:

**Background:** Laparoscopic ureterolithotomy has emerged as a safe treatment for large ureter calculus. We present a study to evaluate the success and complications of laparoscopic ureterolithotomy at our centre. **Methods:** Thirteen cases of impacted calculus in the ureter, underwent laparoscopic transperitoneal ureterolithotomy over a period of two years. The primary outcome measures assessed were the operating time, blood loss, post operative pain, analgesia requirement, drain removal and the discharge days. **Results:** The mean (range) operating time and blood loss was 149.62 minutes (110-210) and 39.62 mL (15-80). The ureterotomy was closed with intracorporeal suturing after placing DJ stent in all the cases. The drain was removed in a mean 3.62 days (2-7). The patients were discharged in a mean time of 5.85 days (3-13). The complications seen were, prolonged urinary leakage in two cases, severe urinary tract infection in one case. There has been no evidence of ureteral stricture on follow up. **Conclusion:** Laparoscopic transperitoneal ureterolithotomy is a safe and effective option for impacted calculus ureter. Although there is a long learning curve, but once the surgeon is acquainted to the technique, the result improves.

**Key Words:** Laparoscopic, transperitoneal ureterolithotomy, impacted calculus.

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#### INTRODUCTION

The ureter stones have troubled humans since time immemorial. Various techniques have evolved to get the best possible treatment. Revolutionary advances in the endourological techniques, has dramatically facilitated the ease with which ureter calculus are removed. But there are certain difficult situations like impacted stones, a procedure failure or the anatomic variations where the surgeon has to resort to alternative options.<sup>1</sup> Open surgery being more invasive is getting replaced by minimally invasive laparoscopic approach. It promises similar clearance rate with lesser post operative pain, early return to work and definitely smaller scars.<sup>2</sup>

An impacted calculus is defined as a stone that remains at the same site in the ureter for atleast 2 months. A guide wire or ureteric catheter cannot be passed proximal to the stone.<sup>3,4</sup> Various literature

have been published showing the safely and efficacy of laparoscopic technique for impacted ureteral calculus. In this study we present our initial experience, in the management of 13 patients of solitary impacted ureter calculus. These patient underwent transperitoneal ureterolithotomy. The aim of this study was to look for the efficacy and safety of this procedure.

#### MATERIALS AND METHODS

Department of General Surgery of a Zonal Hospital in Eastern India performed thirteen transperitoneal laparoscopic ureterolithotomy between June 2012 to June 2014. The data has prospectively collected, statistically analysed and compiled using the SPSS.21 software.

In our series, we defined the impacted calculus in situations where the calculus was larger than 1 cm,

and remained at the same place in the serial ultrasonography (USG) of kidney urinary bladder (KUB) region. Pre-operative stenting could not be performed because of non availability. All the surgeries were performed by a single surgical team. All the surgeries were done in general anaesthesia.

Patient having solitary impacted calculus in proximal (upper and mid) ureter were subjected to a thorough pre-operative evaluation. This included serial USG of the KUB region, intravenous urogram and work up for general anaesthesia. All the patients were admitted one day before surgery for bowel preparation and the part preparation. X-ray KUB was repeated in the morning of day of surgery and the patients were catheterised on table. The surgery was performed under general anaesthesia.

The patient was positioned in flank position with the stone ipsilateral side up and flexing of the operating table. The procedure was performed using four ports, a 10 mm camera port 2.5 cm above and lateral to the umbilicus, two 5 mm working ports 5 cm superior and inferior to the camera port and a fourth 10 mm port in the flank in the mid axillary line used for retraction, placing DJ stent and finally the intra-peritoneal drain (fig1).



Fig 1: Four ports placement.

The dissection was accomplished using a harmonic scalpel and the monopolar cautery hook. The colon and the mesocolon were gently reflected, till the ureter is visualised lying medial to the genital vessels. The site of calculus was localised by a distinct bulge at the site of impacted calculus or by the pinching technique in the difficult situations. Utmost care was taken when dissecting around the ureter, thereby limiting the damage to the peri-ureteral tissues. A ureterotomy incision (vertical incision deep up to the stone) was given on the ureter, the calculus was now exposed and removed out of ureter by a gentle manipulation using the Maryland, grasper and the hook (fig 2).



Fig 2. Ureter calculus extraction.

The stone was extracted using the laparoscopy spoon. A 5 Fr 'double J' (DJ) stent over the guide wire was manoeuvred through the ureterotomy incision into the ureter (fig3,4). The incision was sutured with a 4/0 vicryl. A pelvic drain was placed through the 10 mm flank port. The operative time from port to drain placement and total blood lost during the surgery was noted.



Fig 3: A guide wire manipulated through ureterotomy.



Fig 4: Stent insertion completed

The post-operative pain was managed with injection Voveran 75 mg IM and tablet Voveran SR 50 mg. For objective assessment visual analogue scale (VAS) scoring system from 1 to 10 was used. A note of this pain score was made twice a day. The patients were encouraged to sit with support by the post-operative evening and ambulation by first post-op morning.

The patients were allowed clear fluid sips from post-op evening. A note of post-operative period, when the patient tolerated orals well was made. The drain was removed, when the output was less than 30 ml. The serving soldiers were sent for a four weeks of convalescence after the skin clip were removed. Rest all the patients were discharged after the drain removal, skin clips were removed in the OPD. The DJ stent was removed 6-8 weeks post surgery. The Patients were reviewed with the fresh ultrasound KUB after one month and then three monthly in the initial first year.

**RESULTS**

The demographic details and the results are depicted in table 1 and table 2. A total of 13 patients underwent laparoscopic transperitoneal ureterolithotomy in two years. The mean age (range) was 35.08 ± 12.69 (11-60). Seven (53.85%) were female and six (46.15%) were male patients. The calculus was on right side in eight (61.54%) and left side in the rest five (38.46%) patients. The mean size of calculus was 13.85 ± 1.82 mm (11-17).

S.No.	Characteristic	Distribution	Number of Patients	Percentage (%)
1	Sex	Male	7	53.85
		Female	6	46.15
2	Stone-side	Right	5	38.46
		Left	8	61.54
3	Location of calculus	Upper	7	53.85
		Mid	6	46.15

Table 1: Demographic details.

S. No	Characteristics	Total Number	Min	Max	Mean	Std. Deviation
1.	Age	13	11	60	35.08	12.692
2.	Size of Calculus (mm)	13	11	17	13.85	1.819
3.	Operative Time (mins)	13	110	210	149.62	29.893
4.	Per-Op Blood loss(ml)	13	15	80	39.62	19.199
5.	Drain removal (no of post op-days)	13	2	7	3.62	1.557
6.	Oral Intake (days)	13	1	4	1.85	0.90
7.	Discharge (days)	13	3	13	5.85	3.051

Table 2 : Results of the study

The mean operating time was 149.62 ± 29.83 minutes(110-210), and the mean blood loss was 39.62 ± 19.20 (15-80). There was no requirement of post operative analgesia after the day 4 of surgery. Four patients required one dose of oral analgesics on day 3, six patients required single dose of injectable analgesics on day 2. All the 13 patients required two doses of injectable analgesic on the day 1 and the post op evening ( fig 5).

The drain was removed in a mean 3.62 ± 1.56 days (2-7 ). In two cases there was prolonged urinary leakage and the drain had to be kept for 6-7 days. One of these patient had prolonged post-op ileus, found to have urine collection in the pelvis after the drain removal and required USG guided percutaneous aspiration. The mean duration of oral intake was 1.08 ± 0.90 days (1-4 ). In this same patient the oral intake was delayed to the 4th post-operative day.

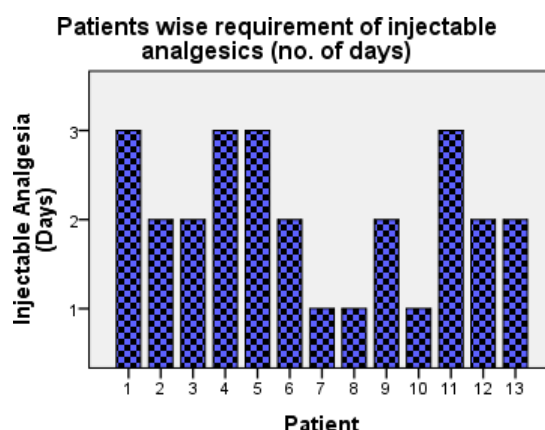


Fig 5: Post operative analgesics requirement.

The patients were discharged in a mean 5.08 ± 3.50 days(3-13). Three soldiers were sent for convalescence of four weeks after skin clip removal on the 7<sup>th</sup> post operative day. Ten patients were

discharged to home, clips were removed in the OPD. No patient had port site infection.

One of the patient (11 yrs old boy) developed severe urinary tract infection two weeks after the surgery. He was re-admitted, DJ stent was removed early and antibiotics were given for a prolonged period of two weeks.

Patients were reviewed after one month, the USG KUB revealed 100% clearance rate and there was decreasing residual hydronephrosis in all the thirteen patients. No patient had developed post-operative ureteral stricture as a late complication in the three monthly follow ups.

## DISCUSSION

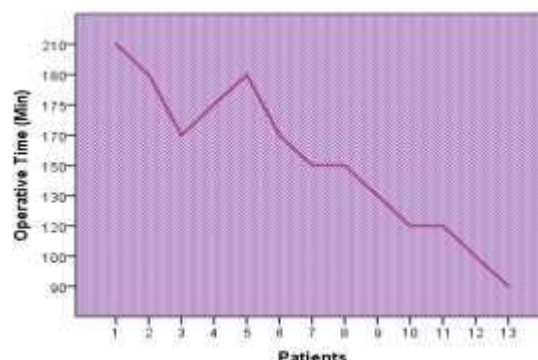
The development and subsequent advances in the minimally invasive techniques has revolutionised the treatment of urolithiasis. A high calculus clearance rates of procedures like ESWL, percutaneous procedures and flexible ureteroscopy has replaced the invasive surgeries.<sup>5,6</sup> However in situations where endourological procedures fails, the surgeon has to resort to invasive ureterolithotomy.<sup>2,7,8</sup> Park et al. in his series, achieved a 72.4% stone-free rate after a single ESWL session, and its rate decreases from 84% to 42% when the stone is larger than 1 cm and impacted.<sup>9</sup>

In the last one decade, because of the modernisation and expertise available, laparoscopic surgery has replaced open ureterolithotomy.<sup>2</sup> There are enough literature to support the facts that laparoscopic technique is a good alternative to retrieve large ureteric calculus in a single sitting. It is associated with a lower postoperative morbidity, shorter hospital stay, shorter time to full recovery and better cosmetic results. Skolarikos et al. has shown a highest level of evidence (2a) and a recommendation of (grade B) supporting the laparoscopic approach of ureteric stone extraction.<sup>1</sup>

Retro-peritoneoscopic ureterolithotomy was first reported by Wickhams in 1979.<sup>10</sup> The transperitoneal approach was first described by Raboy in 1992.<sup>11</sup> Gaur subsequently popularised the reteroperitoneal approach in 1993.<sup>11</sup> The transperitoneal approach allows more working space and a better anatomical identification as compared to the retero-peritoneal route.<sup>12,13</sup> However there are certain drawbacks associated with this approach like injury to internal organs during mobilisation and post op adhesions especially when there is a prolonged urinary leakage.<sup>14</sup>

There is long learning curve, however once the surgeon gets versed with the procedure, the operating time and the blood loss gradually decreases (fig 6) . In a series of 128 cases by Simforoosh N et al.<sup>15</sup> the average operating reported was 132 ± 52.5 minutes which is comparable to that of our mean operating time of 149.2 minutes. Similarly the average blood loss was around 39.62 ml which is comparable

to the series of 1171 by Ma L et al<sup>16</sup> where the blood loss was 56.1 ml.



A line diagram depicting the operative time in various patients.

Fig 6: The operative time decreases with the experience.

The stone-free rate in the laparoscopic ureterolithotomy has been described between 80-100% in various studies.<sup>1,17-20</sup> In our series the stone clearance rate was 100%, none of the patients required conversion to the open. Though this is a small study of 13 cases, but a high clearance depends a lot on a proper case selection and experience of the surgeon.

Prolonged urinary leak is a common complication of this procedure. It can form urinoma and prolong the post operative ileus. During the literature search, we could not find any study which define this problem. However most authors have considered, presence of urine in the drain for a prolonged period of more than 4-5 days can be categorised as prolonged urinary leak. There is varying opinion among surgeons to tackle this problem. Gaur et al.<sup>21</sup> opined that both stenting and suturing of the ureter helps in reducing the post operative urinary leakage. Demirci et al.<sup>22</sup> reported that suturing of the ureter alone is more effective than placing a double J stent in preventing the urinary leak. Laparoscopic placement of ureteral stent is considered to be a technically difficult step. In our series we managed to place a DJ stent and suture the ureterotomy by endosuturing. Two of our patients (15.38%) had a prolonged urinary leak. Role of drain is ambiguous however we routinely placed a pelvic drain (most dependent part) at the end of the surgery in order to prevent the post operative urine and blood collection.

Average hospital stay in the hospital in our series was a mean 5.85 days which is higher to nearly all the similar studies in the past. This could be explained by the fact that few of patients were serving soldiers, who were discharged only after the skin clip removal.

Post-op ureteric stricture/ stenosis is a late complication of this procedure. incidence of which has been quoted up to 20% in various studies.<sup>22,23</sup> Excessive dissection around the ureter damaging the blood supply, use of diathermy hook for ureter

incision, tight suturing of the ureterotomy incision causing wall ischemia, prolonged urinary leakage causing periureteritis, impacted stone<sup>23</sup> are few of the factors described in various studies. In our series till now, we have not detected any ureteric stricture nor has any patient presented with features of intestinal obstruction

In the end we conclude that, if the expertise is available trans-peritoneal laparoscopic ureterolithotomy is a safe and effective treatment option for impacted calculus of the proximal ureter. There is a long learning curve, however once the surgeon has mastered endo-suturing skills, the procedure becomes easy.

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