

Laparoscopic Transperitoneal Ureterolithotomy - An Alternative to Open Surgery

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ABSTRACT- Urinary tract stone diseases are one of the most common afflictions of modern society and it has witnessed much advancement in its management. Keeping in view various aspects of management, we carried out a comparatively newer study called Transperitoneal Ureterolithotomy. This study was carried out to evaluate Laparoscopic Transperitoneal Ureterolithotomy (TPUL) as a viable option to open surgical ureterolithotomy, Laparoscopic Retroperitoneal Ureterolithotomy (RPUL) & endoscopic urology and to assess its place in the spectrum of various surgical interventions for ureteric calculi in a tertiary care center. This study was conducted on 25 selected patients of a single large impacted calculus of size more than 10 mm in the upper and middle ureter. It was observed that conversion to open ureterolithotomy was observed in 4 cases and excessive bleeding in one case. No major perioperative complications were seen. The procedure has definitely shown decreased post-operative discomfort, decreased requirement of post-operative analgesia, better cosmesis, early return to work and less morbidity.

Key-words- Extracorporeal shockwave lithotripsy (ESWL), Open surgical ureterolithotomy, Retroperitoneal ureterolithotomy (RPUL), Transperitoneal ureterolithotomy (TPUL)

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INTRODUCTION

Urinary tracts stone disease, which is one of the most common afflictions of modern society, has affected mankind since times immemorial. It would be fascinating to know that the first evidence of urinary stones dates back to 4800 B.C., when a bladder stone was discovered in an Egyptian mummy at Ed Amrah, Egypt. With westernization of global culture, the site of stone formation has migrated from the lower to the upper urinary tract and the disease earlier was more common in men now is gender blind. Earlier most ureteric calculi were managed by open surgical ureterolithotomy or endoscopic basket extraction. Revolutionary advances in the minimally invasive and noninvasive management of stone disease over the past 3 decades have greatly facilitated the ease with which stones are removed.

The advents of ESWL per cutaneous renal surgery and ureteroscopy with endoscopic lithotripsy have almost eliminated the need for open surgical ureterolithotomy. There remains, however, a group of hard core calculi that are poorly treated by minimally invasive means, being stones that are large, hard, long-standing, impacted and in particular those situated in the upper or middle ureter. In such cases surgical ureterolithotomy still is necessary, with its concomitant invasive trauma, major incision, postoperative pain, significant hospital stay and protracted convalescence. George Kelling of Dresden coined the term celioscopy. ^[1] In 1901 he performed the first laparoscopy. During the last decade laparoscopic surgery has added a further endoscopic minimally invasive option in urology. Since the description of laparoscopic lymphadenectomy ^[2] and laparoscopic nephrectomy ^[3], the role of laparoscopy in urology has expanded enormously. A number of different uretric procedures have been performed including nephro-ureterectomy ^[4] ureterolysis ^[5], ureteric resection and repair ^[6]. This study was carried out to evaluate laparoscopic transperitoneal ureterolithotomy as a viable option to open surgical ureterolithotomy, laparoscopic retroperitoneal ureterolithotomy & endoscopic urology and to assess its place in the spectrum of alternatives for the

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surgical treatment of ureteric calculi in a tertiary care center.

MATERIALS AND METHODS

Source of Data- From May 2013 to June 2014.

This study was conducted in the Department of General Surgery, Indira Gandhi Medical College, Shimla, (H.P.) India on 25 selected patients of large upper and middle ureteric calculi for the duration of one year. The objective of this study was to evaluate the efficacy and safety of Laparoscopic Transperitoneal Ureterolithotomy for the management of large upper and middle ureteric calculi.

Technique

Patients were placed in full flank position with the operating side up for proximal ureteral calculi 3 trocars were used, one umbilical (10 mm) and two in the ipsilateral midclavicular line subcostal (10 mm) and lower quadrant (5 mm). When approaching mid ureteral calculi 4 trocars were used. CO₂ pneumoperitoneum was created with the help of Veress needle through umbilical port. After dissection along the white line of Toldt colon was reflected medially. Iliac vessels and ureter were identified. The ureter was then freed from adjacent structures via sharp and blunt dissection till the stone site was reached. Once the stone was localized by 'ureteral pinching', the cold knife was used to incise the ureter over the stone. Maryland dissector was used to fish out the stone with the closed forceps tip. Following this, the stone was held by a gall bladder extractor & removed through 10 mm port. The decision regarding the placement of DJ stent was taken intraoperatively. Once the stent was in place 4-0 vicryl was used to close the ureterotomy site with interrupted stitches and a tube drain was placed through one of the ports.

RESULTS

The mean ages of the patients were 37.80 years. Out of 25 cases, 19 (76%) were male and 6(24%) were female. Operative complications and conversion to open ureterolithotomy has tabulated below:

Table 1: Operative complication and conversions

S. No.	Complication	No. of Cases (%)
1.	Stone lost	2(8)
2.	Bleeding	1(4)
3.	Lump formation	1(4)
4.	Conversion to open ureterolithotomy	4(16)

Table 2: CO₂ consumed (On Average in every five cases)

	1	2	3	4	5
Mean CO ₂ consumed (liters)	81	72.4	51.8	40.4	19.32

Table 3: Mean Time (Minutes) For Each Five Cases

No. of cases	Mean Time in minutes	Mean of all cases
1 st five	120.6	
2 nd five	98.6	79.64
3 rd five	82.6	
4 th five	57	
5 th five	39	

DISCUSSION

SYMPTOMATOLOGY

Pain, Number of Attack and Adhesions

In the present study, 100% (25) of patients complained of pain prior to admission in the hospital. Our patients have suffered 3.76 attacks of ureteric colic on an average prior to surgery. There was nothing in the literature regarding the number of attacks suffered by the patients.

Time Taken for Surgery

The mean time taken for completion of the procedure in our series was 79.64 minutes (range 30 to 135 min). Simforoosh^[7] reported a mean operating time 132±52.2 for TPUL. El-Feel^[8] had operating time ranging from 55 to 180 minutes with a mean operating time of 145 minutes. Feyaerts^[9] had similar reports with a mean operating time of 111 minutes (range, 45-180 minutes). The time consumed in our patients decreased gradually from a mean of 120.6 min in first five cases to 39 min in last five cases. The minimum time taken was 30 minutes. It appears that the time required to perform laparoscopic TPUL decreased as the experience was gained by the operating surgeon.

CO₂ Consumed

On an average 53 litres of gas (CO₂) per case was used in this series. No such report was available regarding the consumption of gas in literature. CO₂ consumption gradually decreased over the period of time. We ascribe this significant reduction in CO₂ consumption in later cases to the decrease in time taken for surgery.

Conversion

In the present series 4(16%) of our cases were converted into open ureterolithotomy. The reasons for open conversion were adhesions, inadvertent bleeding, lump formation and spillage of stone. Similar difficulties have led to conversion to open method in other series in the literature.

Intra-Operative Complications

Adhesions

Only four of our patients (16%) had multiple adhesions around ureter. Two (8%) of them were converted to open surgery. The possible reason for adhesion probably was seeking late medical advice as they came from far flung areas. Literature is silent regarding the causes of the presence of adhesion.

Lump Formation

In spite of screening, one patient (4%) had lump formed around ureter. This particular patient had adhesions around the surrounding structures with the formation of a large lump at the site of the impacted stone and the dilated ureter was bent upon itself posing difficulty in identifying ureter, the decision to convert to open surgery was taken.

Spillage of Stone

This complication occurred in 2(8%) patients during extraction of stone. This is a known complication and has been reported in many published case series, Basiri^[10] and Simforoosh, with an incidence of 0.8% to 2%.

Bleeding

We encountered minor bleeding during the procedure in a few cases. We encountered major bleeding in one (4%) of our cases. The case was completed by converting to open surgery.

Major Vessel and Visceral Injuries

None of our patients sustained these injuries, though the reported incidence of major vessel injuries in the literature ranges from 0.03 to 0.06% and of G.I. injuries 0.06 to 0.4%.

Urinary Injuries

None of our cases encountered bladder or ureteric injuries as reported in the literature.

Post-Operative Complications

In our series, none of the patients had wound infection, abscess formation, prolonged ileus or deep vein thrombosis. These post-operative complications reported in various case series by Feyaerts, EL Feel, and Basiri.

Hospital Stay

In our series mean hospital stay was 5.77 days. F.X. Keeley^[11] reported a mean length of stay was 5.6 days. Basiri reported a mean hospital stay of 5.8±2.3 days.

Postoperative Pain

The mean days of analgesic (diclofenac) requirement for Laparoscopic TPUL were 3.64 days. Literature was silent regarding analgesic requirement.

Post-Operative IVP

All cases in the present series underwent post-operative IVP after a period of four to six weeks. None of the patients

had post operative stricture. Ahmed Al Sayyad et al.^[12] reported one case of post-operative stricture managed by endoureterotomy.

DJ Stenting and its Removal

DJ Stenting was done in 7 cases of the present series. DJ Stent was removed after 4 to 6 weeks endoscopically.

General Benefits of the Procedure

From our initial experience of this small series, it can be safely deduced that the greatest benefit of Laparoscopic TPUL comes from the rapid return of activity that it permits. Most of the patients were discharged from the hospital without activity restrictions and could return to work as soon as they felt normal. This should result into an overall cost effective and cosmetic procedure for the patient.

CONCLUSIONS

The increased skills of the surgeons & advances in endoscopic equipment have made laparoscopy the technique of future. In our experience of laparoscopic TPUL in Indira Gandhi Medical College, Shimla the procedure can be done without any major complication. Good knowledge of the open ureterolithotomy is required for timely conversion if any complication is encountered during TPUL. Time taken for surgery should be no criteria for academic groups. The procedure has definitely shown decreased post-operative discomfort, decreased requirement of post-operative analgesia, better cosmesis, and early return to work and less morbidity. TPUL can be considered as another well-established armamentarium in the armor of general surgeons and is recommended as an effective, minimally invasive primary treatment in large, impacted difficult stones in the upper & mid ureter otherwise indicated for open ureterolithotomy.

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