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Research Article

Laparoscopic stone surgery for renal and ureteric stones: an evaluation

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ABSTRACT

Background: Laparoscopic pyelolithotomy and uretrolithotomy have taken the laparoscope out of the confines of the peritoneal cavity and into areas, which were hitherto inaccessible to the laparoscope. Our present study was an evaluation of laparoscopic pyelollithotomy and uretrlithotomy.
Methods: This observational study was conducted at S.N. Medical College and associated hospital, Agra, India in the Department of Surgery to evaluate retroperitoneoscopic surgeries. A total of 38 patients were included with a diagnosis of ureteric calculus and renal calculus.
Results: Average time of operation in laparoscopic pyelolilthotomy was 87.27 minutes and for ureterolithotomy was 58.12 minutes. Conversion was required in 3 cases, mainly because of peritoneal breach or bleeding and ureteric injury. There were complications in the form of persistent pain (15.7%) wound infections (10.52%), urinary leakage (2.6%) and ileus / vomiting (2.6%). Successful retroperitoneoscopic surgeries required lesser postoperative analgesics than the converted cases. The average duration of drain was 1.78 days.
Conclusions: We are entering an exciting new era of minimal access surgery. Our patients will benefit from these new techniques, but we have a responsibility to apply it carefully and only after becoming competent in the performance of these procedures.

Keywords: Laparoscopic pyelolilthotomy, Ureterolithotomy

INTRODUCTION

The modern era of laparoscopic surgery has evoked remarkable changes in approaches to surgical diseases. The trend towards minimally invasive surgery has prompted the general surgeons to scrutinize nearly all operations for possible conversion to laparoscopic techniques. With introduction of the balloon technique for retroperitoneal laparoscopy, retroperitoneoscopy has become much easier. Retroperitoneal endoscopy is not new but without the availability of current instrumentation previous attempts were not often successful, due to non-availability of more sophisticated instruments and lack of experience, retroperitoneoscopic pyelolithotomy and ureterolithotomy were discouraged in favour of percutaneous nephrolithotomy (PCNL) technique, extracorporeal shock wave lithotripsy (ESWL) and ureteroscopic removal of stones. With the time the technique of laparoscopy in urology has evolved tremendously making possible not only laparoscopic pyelolithotomy and ureterolitotomy, but other procedures like nephrectomy, pyeloplasty etc. has one become very safe, feasible and effective procedure.

The first transperitoneal laparoscopic removal of renal calculus from an ectopic pelvic kidney was reported by Eshghi et al in 1985 and first retroperitoneal laparoscopic pyelolithotomy by Gaur et al in 1994.[1,2]

Renal and ureteral stone diseases continue to be a major national and international health problem. Although

surgical removal of the renal and ureteral stones have been challenged by the development of several new non-invasive or minimally invasive procedures like ESWL, PCNL, Ureteroscopic removal of stone and laparoscopy. Recently the introductions of laparoscopic pyelolithotomy and ureterolithotomy have revolutionized our approaches to a number of problems and has forced for re-evaluation of clinical strategies.

The advantages of laparoscopic pyelolithotomy and ureterolithotomy are decreased pain and disability and improved cosmesis without increased mortality and morbidity rates with shorter hospital stay and quicker resumption of normal activities, including return to work, have been reported. Because of the awareness of these advantages even public has started demanding these procedures instead of open surgery.

The present study was undertaken to evaluate the results of laparoscopic pyelolithotomy and laparoscopic ureterolithotomy in the management of renal and ureteral stones and to find out the role of laparoscopic pyelolithotomy and laparoscopic ureterolithotomy in reducing complications, time to resumption of fluids and normal diet, postoperative hospital stay and convalescence, wound infections and time to return to full home activities and social activities.

METHODS

This one year observational study was conducted on 38 patients admitted in surgical ward of S.N. Medical College Agra, India with symptoms and signs of renal and ureteric stone diseases (such as pain located anteriorly in the subcostal area, pain radiating from loin to groin, groin pain radiating to external genitalia or anterior aspect of thigh, history of haematuria and pyuria) after taking permission from the Institutional Ethical committee. Informed consent was taken from all the patients. Diagnosis was confirmed by X KUB and IVU and the patients were divided into two study groups: Pyelolithotomy (group A) and Ureterolithotomy (group B).

Criteria for selection

By explaining various treatment options to the patient and their attendants, the choice of type of operation was left on the patient's will.

A criterion for evaluation was based on duration of operation, anatomical abnormalities, intra operative complications and causes of change of procedure, if needed.

Clinical profile of the patients was assessed. Detailed history was taken which included history of present illness (in terms of duration of symptoms, aggravating factors, relieving factors and associated symptoms like nausea, vomiting and pyrexia), Past and family history (Whether the patient had any previous kidney stone or ureteric stone surgery or not, because laparoscopic pyelolithotomy and ureterolithotomy are contraindicated if previous renal and ureteral surgery was done for stone because presence of adhesions laparoscopic procedures will be difficult to perform). History of diabetes, hypertension, I.H.D, tuberculosis, CVA and chronic obstructive airway disease ad history of drug sensitivity or drug intake or any addictions (alcohol, smoking and drugs) was also taken.

Physical examination included local, general and systemic examinations was performed.

Investigations such as blood and urine tests were done. For confirming diagnosis X-Ray KUB and U.S.G. abdomen was performed. Excretion urography was done to establish the presence of a calculus. Operative procedure was explained to the patient and the family. Proper postoperative management was done. Statistical analysis was done using SPSS and results presented in form of percentages.

RESULTS

Two types of laparoscopic retroperitoneoscopic procedures were carried out in 38 patients with 3 cases requiring conversion and with 35 successful cases. Out of 3 conversions, in laparoscopic pyelolithotomy (group A), there were 2 conversions in open pyelolithotomy due to peritoneal breach and bleeding while in laparoscopic ureterolithotomy (group B) there was one conversion in open ureterolithotomy due to ureteric injury.

Table 1: Distribution of cases according to age and sex.

Operation	Sex	No. of cases	Age (years)		
			< 20	21-40	41-60
Pyelolithotomy (group A)	M	14	2	8	4
	F	8	1	4	3
Ureterolithotomy (group B)	M	11	1	8	2
	F	5	0	3	2

Maximum incidence of urinary stone disease was observed in males (65.7%) and in 21-40 years age group i.e. 60.50% (Table 1).

The mean operative time for group A (laparoscopic pyelolithotomy) is 87.27 minutes and for group B (laparoscopic ureterolithotomy) is 58.12 minutes.

Intra-operative complications i.e. bleeding and peritoneal breach were seen in two cases and one case respectively. A total of 10 patients had post-operative complications, out of which 2 patients had more than 1 complication. Persistent pain turned out to be the most common complication seen in 6 (15.7%) cases. Wound infection was next most common complication observed in 4 (10.52%) of cases. Persistent urinary leakage and vomiting occurred in one case each.

Table 2: Distribution of patients according to pyelotomy/ureterotomy management.

Left open/ closed	Group A Pyelotomy management		Group B Ureterotomy management	
	No.	%	No.	%
Left open	5	25	2	13.33
Closed with 4-0 vicryl/Chromic catgut	15	75	13	86.66

Out of 20 pyelotomies, 5 (i.e. 25%) left open while 15 pyelotomies (i.e. 75%) were closed with 4-0 Vicryl/ chromic catgut. Out of 15 ureterotomies, 2 (i.e. 13.33%) were left open and 13 were closed with 4-0 Vicryl/chromic catgut. Out of 15 laparoscopic ureterolithotomy, 9 cases had D. J. stenting preoperatively or intra operatively (Table 2).

The average duration of retroperitoneal drain was 1.78 days. The mean amount of blood loss during the procedure in group A was 63.8 ml and in group B was 72.5 ml.

Table 3: Post operative complications.

Post-operative complications	Group A		Group B	
	No.	%	No.	%
Wound infection	3	13.6	1	6.25
Post-operative fever	1	4.54	2	12.5
Surgical emphysema	1	4.54	-	-

The above table shows the various post-operative complications in group A and group B patients. In group A, the most common post-operative complication was post-operative wound infection i.e. 13.6%. While in group B, the most common post-operative complication was post-operative fever. The mean post-operative analgesia (Inj. Tramadol 2 mg/kg) was 1.53 doses parenteral and 4 doses oral (Tab. Diclofenac 50 mg/12 hourly). The mean duration of post-operative hospital stay was 46.42 hours. All of the patients resumed oral fluid on same day and diet on the next day. The time taken for regaining home activities ranged from 3 - 7 days and social activities ranges from 7 - 15 days.

DISCUSSION

No surgical technique in recent memory has generated, so much excitement and enthusiasm among general surgeons as has interventional laparoscopy. The laparoscope is now being used for a variety of procedures. The introduction of the balloon dissection technique has taken the laparoscope out of confines of the peritoneum to the retroperitoneum.

Presently most of the renal pelvic calculi are treated with E.S.W.L. and P.C.N.L. in developed countries, which have markedly decreased the morbidity. Since the introduction of E.S.W.L. and ureteroscopy for the management of ureteric calculi, the routine use of an open surgical approach for removal of ureteric calculi has rapidly declined. However large ureteric calculi pose significant challenge for modern endourologic techniques, often requiring several endoscopic procedures as well as E.S.W.L. session. E.S.W.L. is found to be suitable for managing ureteric stones of <1 cm size. As the stone size increases, the chance of clearance decreases and of the need for multiple sessions increases. Park et al [3] reported that the stone free rate decreased from 84% to 42% when the stone was more than 1 cm in size. Thus the indications for laparoscopic ureterolithotomy in the age of modern endo-urology include stones, which cannot be accessed ureteroscopically or cannot be fragmented.

A survey carried out in Bombay in 1994 by D.D. Gaur showed that the percentage of patients undergoing an open surgical procedure for renal lithiasis in the city's six major hospitals was quite high (41%).[2] Retroperitoneal laparoscopic pyelolithotomy can be considered as an economically viable minimally invasive alternative for these patients in developing countries like India.

Laparoscopic pyelolithotomy is the procedure of choice for selected patients of renal lithiasis, if it can be safely and efficiently performed using a minimally invasive technique because of their additional advantages.

In the present study, the operative time for laparoscopic pyelolithotomy ranges from 25 minutes to 120 minutes, mean operative time was 87.27 minutes. It is less in comparison to the study done by Gaur et al, where the mean operating time was 120 minutes.[2] Micali et al, reported the operating time to be ranging from 153-395 minutes (mean operating time 249 minutes) and Hemal, et al reported the operating time ranging from 55-240 minutes (Mean operative time 108.2 minutes).[4,5]

In this study, Pyelotomy/ureterotomy was made by diathermy loop or endsknife or endoscissor. The pyelotomy was left open in 5 patients and closed with chromic 4-0/ vicryl 4-0 in 15 patients while ureterotomy was left open in 2 patients due to edematous ureter and sutured with chromic 4-0/ vicryl 4-0 in 13 patients. Closure of pyelotomy is not necessary if the drainage of the ureter is well established, as it heals spontaneously.

Sometimes the laparoscopic procedure has to be converted into open surgery. The conversion rate falls with the increasing experience of the surgeon.

All the conversions were done during the initial phase of this study, with the learning curve, and found no such complications later on. In our study stenting was done in laparoscopic ureterolithotomy group B, rest of the patients had no ureteric stent. Previously placed ureteral stent helps in ureteral identification and can be used as an internal stent prolonging post-operative drainage. In our study, we placed retroperitoneal drain in 35 patients out of 38. The average duration of drain was 1.78 days. Laparoscopic pyelolithotomy and laparoscopic ureterolithotomy being minimally invasive procedures require much smaller doses of analgesics. In our series of

laparoscopic procedures the mean post-operative analgesia was 1.53 doses parenteral and 4 doses oral. In our study group, the mean time of resumption of diet was 12 days and for fluid, it was 1.75 days. This observation clearly indicates that resumption of fluid and normal diet is earlier in laparoscopic procedures. Patients who underwent laparoscopic pyelolithotomy/laparoscopic ureterolithotomy were ambulatory on the day of surgery and regained full home activities in 3-7 days and full social activities in 7-15 days. The mean duration of hospital stay in our study group was 46.2 hours. The above observation in our study clearly denotes that there is reduced mean hospital duration in laparoscopic surgery.

Chander et al compared the retroperitoneal laparoscopic pyelolithotomy versus extra corporeal shock-wave lithotripsy for management of renal stones.[6] The RPPL group showed better stone clearance, fewer hospital visits, low analgesic requirement, fewer number of man days lost, and early resumption of normal activities, as compared to the SWL group.

In our study group A, 10 patients had postoperative complications. Persistent pain turned out to be the most common complication and wound infection was next most common complication. The wound infection was mainly due to prolonged duration of surgery in some of the patients.

There was a significant learning curve in the retroperitoneoscopic surgeries. We needed about 10 to 15 cases to be tuned to the concept and the idea of this type of surgery. 15 cases are accepted in literature as being part of the learning curve for such procedures.

The important point is to take conversion as manifestation of the long learning curve of the procedure. Not many surgeons are acquainted with laparoscopic retroperitoneal surgeries. This approach has basically been picked up all over the world in the previous years.

Retroperitoneoscopic surgery is appropriate for pyelolithotomy and ureterolithotomy. Since this a small study with only 38 cases in all, a much larger series would be needed in future to evaluate the appropriateness of laparoscopic pyelolithotomy and ureterolithotomy.

The usefulness of the procedure is not only in the performance of these procedure but these procedure, could later be used for more demanding surgeries like nephrectomy, lumbar sympathectomy, adrenalectomy, bladder neck suspension and removal of retained double – J stents. As such, any procedure in the retroperitoneum could become possible in the future.

Laparoscopic approach should be utilized for stone management in urinary tract where SWL, PCNL and ureteroscopy have failed or deemed unsuitable. It is also available option in patients with unusual anatomy such as a pelvic kidney with stone resistant to fragmentation.[7]

It can be the salvage procedure in cases of failed endoscopic treatment. However, it is more invasive in nature than endoscopic procedures. Therefore, it should be reserved as the last resort option for renal calculi management in the modern endourology era.[8]

CONCLUSION

We are entering an exciting new era of minimal access surgery. Though the access is minimal, the operation and the potential for complications are major. Our patients will benefit from these new techniques, but we have a responsibility to apply it carefully and only after becoming competent in the performance of these procedures. Patient's safety must be paramount when deciding about the procedure.

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