International Journal of Research in Medical Sciences
Choudhary C et al. Int J Res Med Sci. 2017 Jul;5(7):2943-2946
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20172591

Original Research Article

Laparoscopic versus open pyelolithotomy: our experience of 40 patients

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Received: 13 May 2017
Revised: 30 May 2017
Accepted: 02 June 2017

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ABSTRACT

Background: The development of minimally invasive surgical techniques for the treatment of patients suffering from urinary lithiasis has been greatly dependent on technologic advances in the fields of fiberoptic, radiographic imaging, and lithotripsy (shockwave, ultrasonic, electrohydraulic, and laser). The objective of this study was to compare laparoscopic with open pyelolithotomy in relation to various indices and to ascertain whether laparoscopic surgery has superseded open surgery in modern era.
Methods: The study was conducted in Department of Surgery, GSVM Medical College and associated Hospital, Kanpur, Lucknow, India from January 2012 to September 2013. 40 patients who were diagnosed with renal pelvic stones, between the age group of 6-70 years were included in this study. Patients were assigned to either laparoscopy group or open group by a computer generated random number. In present study, all the patients in the laparoscopy group were operated by retroperitoneal approach.
Results: The male: female ratio was 2:1. The mean pain score was significantly less in laparoscopic group. Drain removal was done earlier in laparoscopic group. The patient in laparoscopic group stayed less as compared open groups. Of the total patients, who underwent surgery 6 sustained surgical complications in open group and only 1 in laparoscopic group. The patients who had undergone laparoscopic surgery returned to work earlier than those with open.
Conclusions: Patients operated by laparoscopic surgery shown a better post-operative recovery course, complaints of less pain and thus required less analgesia, returned to normal routine activity earlier, intra-abdominal drain was removed at a much earlier period as compared to open group patient, this not only reduced morbidity but also because of this patient could be discharged earlier. The complication rates were more in the open group as compared to laparoscopic group in terms of surgical site infection, urine leakage and post-operative fever. Patient satisfaction with cosmesis was more in laparoscopic group as compared to open group (as assessed by visual analogue score).

Keywords: Laparoscopic treatment, Open approach, Renal pelvic stones, Retroperitoneal approach

INTRODUCTION

Although stone disease is one of the most common afflictions of modern society, it has been described since antiquity.

Revolutionary advances in the minimally invasive and non-invasive management of stone disease over the past 2 decades have greatly facilitated the ease with which stones are removed.

The lifetime prevalence of kidney stone disease is estimated at 1% to 15%,[1,2] with the probability of having a stone varying according to age, gender, race, and geographic location.[3,4] Stone disease typically affects adult men more commonly than adult women. Men are

affected two to three times more frequently than women. Stone occurrence is relatively uncommon before age 20 but peaks in incidence in the fourth to sixth decades of life.[2]

Due to the major improvements in the fields of endourology (ureterorenoscopy and percutaneous nephrolithotripsy) and shock wave lithotripsy, the need for open surgery for ureteral and renal stones has diminished.[5] Nevertheless, the guidelines of the European Association of Urology (EAU) state that the methods of open stone surgery are still needed in some special situations.

Several centres reported that open surgery was used in 1% to 5.4% of all cases treated for urolithiasis. However, the EAU guidelines point out that laparoscopy as a tool in the therapy of ureteral or renal stones is increasingly used in situations for which open surgery would previously have been used. This review focuses on the indications and possibilities of open and laparoscopic stone surgery and their place in daily clinical practice.

METHODS

The study was conducted in Department of Surgery, GSVM Medical College and associated Hospital, Kanpur, Lucknow, India from January 2012 to September 2013. 40 patients who were diagnosed with renal pelvic stones, between the age group of 6-70 years were included in this study. Patients were assigned to either laparoscopy group or open group by a computer generated random number. In present study, all the patients in the laparoscopy group were operated by retroperitoneal approach, port placement shown in Figure 1.

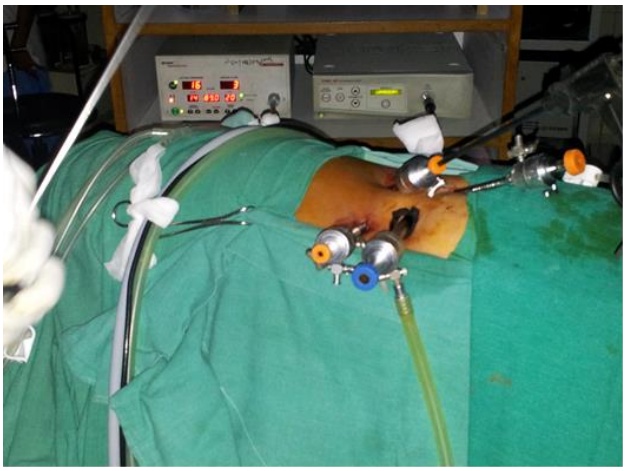

Figure 1: Retroperitoneal surgery-with all ports established.

RESULTS

The male: female ratio was 2:1 with total number of male patients 27 (67.5%) and female patients 13 (32.5%). The mean pain score obtained by visual analogue scale was significantly less in laparoscopic group in first 48 hours but score was comparable on 7th post-operative day. A drain was inserted in all the cases in both groups. Removal was done after an average of 4.25 and 7.55 days with S.D. 1.99 and 1.95 in laparoscopic and open group respectively. The difference was found to be statistically significant. (p value<0.0001). The patient in laparoscopic group stayed on an average for 5.7 days (S.D. 2.29) post operatively as compared to 7.5 days (S.D. 1.93) in open groups. The difference was very significant (p value=0.0106) of the total patients, who underwent surgery 6 sustained surgical complications in open group and only one in laparoscopic group. There was a statistically significant difference in incidence of infection between 2 groups. The patients who had undergone laparoscopic surgery returned to work after an average of 10.75 days (S.D. 2.93) and those with open surgery took 17 days (S.D. 3.09). The difference was found to be extremely significant (p value<0.0001).

DISCUSSION

The success rate (in terms of stone removal) in this study was 100% in the laparoscopic group and 97 % in the open group.

As regards the access technique for laparoscopic surgery, Guidelines on laparoscopy (Doublet JD et al) (as published by the European Association of Urology) were adhered to as much as possible. We did not use a second video monitor or bipolar cautery. Port placement though, had to be tailored to the individual case and was decided on the basis of an early morning Skiagram of the KUB region.

The total duration of surgery was 85 minutes in the laparoscopic group and 97 minutes in the open group and it seems to be comparable and statistically non-significant. The longest was 126 minutes in open surgery and 116 minutes in laparoscopic surgery in a patient who had the calculus impacted in the pelvis. This necessitated a hunt for the calculus in the narrow pelvis and the constraints in space thereof. In addition, the persistent obscuration of vision by blood took up a major portion of the operative time. Though successful, our experience was similar to other teams who had attempted the retroperitoneoscopic approach. Also, there was a gradual decrease in operative time as experience increased over the course of the study.

The pelviotomy site was left unsutured only in 4 cases in the laparoscopic arm whereas it was sutured in all cases in the open arm. Keeley et al in 1999 had stated that the ureterotomy does not generally require suturing, especially with a stent in situ as laparoscopic suturing techniques at, that time did not permit confident placement of sutures in an undilated/inflamed ureter.[6] In a 2004 study, Demirci et al observed that suturing of the ureter was more effective than placement of a double J stent to reduce urine extravasation.[7] Even though the case

number was limited, the suturing in a non-inflamed ureter/pelvis was beneficial.

Drains were placed in all the patients in both arms and removed after a mean of 4.2 and 7.5 days respectively. The difference in the total time taken till drain removal was significant. In a study conducted by Kramer BA et al, drains were removed on the first postoperative day following laparoscopic pyelolithotomy in all of the 5 studied patients.[8] The time prior to drain removal in a study conducted by Chander J et al, ranged from 2 days to 7 days.[9] The drain was removed during first 48 hours in most patients (61%).

Prolonged urinary leak was observed in 1 case in open group and in no case in laparoscopic group. The Foley's catheter was kept in situ for a longer time in both to prevent stasis and reflux of urine into the ureter, only one patient developed post-operative fever. Surgical site infection (SSI) was seen in 6 patients of the open group and one in laparoscopic group. The infection resolved with regular dressing and antibiotics (according to pus culture sensitivity reports) in all expect to two patients in which there was added morbidity and an ensuing unsatisfactory scar due to healing by secondary intention in the first case. The second case required readmission in view of severe SSI and a partial response to antibiotics. Repeat culture showed Staphylococcus aureus sensitive to piperacillin-tazobactam combination and resolution was achieved with a course of intravenous antibiotic.

Complications during retroperitoneal surgery can be broadly classified into those of access, dissection, wound healing and associated trauma. Among the complications of access and dissection, peritoneal tears are the most common. But we did not encounter any such complication. A peritoneal tear may occur either when inserting the ports or during the dissection.

Preventive measures include placing each port under direct vision, especially those placed along the anterior axillary line and putting the patient in a full lateral tilt to allow the peritoneum and bowel to displace from the site of the primary port. Gill et al advocated placing secondary ports under manual guidance which allows the peritoneum to be manually reflected away before inserting the trocar.[10] But the large primary port incision increases the chances of subcutaneous emphysema, especially if a port with a sub fascial retention balloon is not used.

Subcutaneous emphysema may be caused by the leakage of $C0_2$ from around the port site. None of the patients in present study developed this complication as we used reusable sub fascial retention balloon in all laparoscopic group patients.

Patient characteristics such as previous surgery, calculus disease and a history of infections are the most important determinants of the risk of complications.[11] Blood loss during surgery was more in open group as compared to laparoscopic group but none of the patient in present study had major vascular injury requiring blood transfusion.

Mean visual analogue score was 6.9 on day 1, 4.75 on day 2 and 1.8 on day 7 in the laparoscopy group and 7.8 on day 1, 6.45 on day 2 and 2.3 on day 7 in the open group. There was a significant difference in pain scores between groups and also a significant reduction in pain each successive day. Three patients in the open arm and one patient in laparoscopic arm required additional analgesic in the form of the opioid, tramadol.

Factors such as reduced postoperative pain and early ambulation resulted in shorter hospital stays. The mean hospital stay in the open group was 7.5 days, which was significantly longer than that of the laparoscopic group, which was 5.7 days. Sinha et al. which reported an average hospital stay of 3.6 days for patients who underwent laparoscopic pyelolithotomy.[12] Similar results were reported by Goel et al, in their study, in which the hospital stay for laparoscopic pyelolithotomy patients was 3-4 days.[13]

Return to normal activity from day of operation in laparoscopic and open arms required a mean of 1.65 and 2.25 days respectively (p value=0.0178), thus considered statistically significant. Return to the work after surgery or number of man days lost had a mean of 10.75 and 17 days in the laparoscopic and open groups respectively which was extremely significant (p value<0.0001).

Patient satisfaction with cosmesis was more after laparoscopic surgery and was assessed by visual analogue score

CONCLUSION

Patients operated by laparoscopic surgery demonstrated a better post-operative recovery course, complaints of less pain and thus required less analgesia, returned to normal routine activity earlier, intra-abdominal drain was removed at a much earlier period as compared to open group patient, this not only reduced morbidity but also because of this patient could be discharged earlier. The complication rates were more in the open group as compared to laparoscopic group in terms of surgical site infection, urine leakage and post-operative fever.

Patient satisfaction with cosmesis was more in laparoscopic group as compared to open group (as assessed by visual analogue score).

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Choudhary C, Jauhari A. Laparoscopic versus open pyelolithotomy: our experience of 40 patients. Int J Res Med Sci 2017;5:2943-6.