COMPARISON OF MANAGEMENT OUT COMES OF OPEN AND LAPAROSCOPIC CHOLECYSTECTOMY IN THE TREATMENT OF SYMPTOMATIC CHOLELITHIASIS

Asifa Dian, Umar Farooq Azam, Naveed Akhtar Malik, Jahangir Sarwar Khan, Mussadiq Khan

Holy Family Hospital Rawalpindi

ABSTRACT

Introduction: Open cholecystectomy (OC) has gradually been superseded by laparoscopic cholecystectomy (LC) for the treatment of cholelithiasis. Laparoscopic cholecystectomy is associated with fewer complications than open cholecystectomy when performed in experienced hands. The study was conducted to compare the two techniques for management of symptomatic gall stones.

Objective: Our objective was to compare the management outcomes of laparoscopic cholecystectomy with those of open cholecystectomy in the treatment of symptomatic cholelithiasis.

Study Design: Quasi experimental study.

Settings: It was carried out at Surgical Unit - I of Holy Family Hospital, Rawalpindi.

Subjects and Methods: Eighty consecutive patients with symptomatic cholelithiasis confirmed on ultrasonography from September 2007 to March 2008 were included in the study. They were randomly allocated to LC or OC and were eventually operated.

Results: Mean operating time of LC was 64 minutes (30-90) (SD=13.4) where as in OC it was 37.12 minutes (25-70) (SD-9.6). Return of bowel sounds postoperatively was within 12 hours (9-18) (SD=3.25) in LC while it was 16 hours (9-30) in OC group (SD=4.75). Postoperative hospital stay was 1.5 days mean (1-4 days) (SD=0.71). In LC while it was 2.9 days (2-5) in OC group (SD=0.84). The duration of injectable analgesia requirement was 1.3 days (1-3) (SD=0.51) and 1.8 days (1-3) (SD=0.7) in LC and OC patients respectively. The gall bladder perforation was 22.5% in OC and 15% in LC. The common bile duct injury occurred in 2% of patients with LC while none with OC. The conversion rate was 5%.

Conclusion: Laparoscopic cholecystectomy is safe treatment of cholelithiasis with short duration of postoperative hospital stay, lesser post operative pain, early return of normal bowel activity as compared to the open cholecystectomy.

Keywords: Cholelithiasis, Common bile duct injury, Gallbladder, Laparoscopic cholecystectomy, Open cholecystectomy.

INTRODUCTION

The general trend in surgery has been toward less invasive, safer procedures. The first documented laparoscopic cholecystectomy was performed by Erich Mühe in Germany in 1985. Laparoscopic cholecystectomy was introduced in United States in 1989[1].

Laparoscopic cholecystectomy is a safe and feasible procedure and has become the first line of treatment for symptomatic cholelithiasis[2]. Currently, over 90% of cholecystectomies are performed laparoscopically; making it the most common procedure performed in general surgery practice[3]. The original laparoscopic cholecystectomy technique has under gone a vast maturation over the past decade[4].

Commonly stated post operative advantages are decreased postoperative pain, respiratory and wound complications, early return of gastric function and shortened hospitalization and recovery times in comparison with an open surgical procedure[5].

Knowledge of various factors predicting possible conversion helps to reduce the overall morbidity of laparoscopic cholecystectomy. Other

Correspondence: Dr Asifa Dian, Sir Syed Colony, Tipu Road, Rawalpindi
Email: asifadayan911@hotmail.com
Received: 23 Oct 2008; Accepted: 30 June 2010

problems can be avoided or dealt with efficiently during the procedure by a well-trained and experienced team, in order to minimize the chances of conversion to open surgery[6,7].

The direct costs of laparoscopic procedures are higher than open operations as a result of longer operation times and expensive equipment. As a result of shorter hospitalization and quicker return to work, the overall health care costs may be reduced, but strong unbiased evidence is still lacking[8].

Objective of the study

To compare the outcome of laparoscopic cholecystectomy (LC) with those of open cholecystectomy (OC) in the treatment of symptomatic cholelithiasis.

MATERIAL AND METHODS

This quasi experimental study was carried out at surgical unit - I of Holy Family Hospital Rawalpindi for Six months from September 2007 to March 2008. Eighty (80) consecutive patients with symptomatic cholelithiasis suitable for surgical treatment with both laparoscopic and open cholecystectomy were divided for treatment with either surgical procedure (40 patients in each group). Comparison of the outcome of two surgical procedures was done in terms of operation time (in minutes), post operative time required for return of normal bowel activity (audible bowel sounds) (in hours), post operative hospital stay (in days), post operative requirement of analgesics (number of days), rate of conversion from laparoscopic to open cholecystectomy and intra - operative complications e.g gall bladder perforation, uncontrolled hemorrhage, common bile duct injury or ligation of common bile duct and injury of viscera during trochar or verres needle insertion in laparoscopic cholecystectomy. Patients were selected through non probability consective sampling. Patients with history of biliary colic and abdominal ultrasound revealing gall stones fit for either type of surgical procedure and patient under going abdominal surgery for first time were included in the study while patients with empyema gall bladder, dilated common bile duct, jaundice, cirrhosis of liver, ascities, peritonitis, morbid obesity, ischemic heart disease, ASA grade 3 and above gall bladder carcinoma and acute pancreatitis were excluded from the study.

Laparoscopic cholecystectomy and open cholecystectomy procedures were independent variables. Experties of different surgeon was confounding variable which was controlled by making sure that all procedures were performed by a team of surgeons with same level of competence.

Eighty consecutive patients with symptomatic cholelithiasis (biliary colic, previous history of acute cholecystitis,) admitting in ward fulfilling inclusion criteria were included in the study.

All patients underwent ultra sound abdomen and pelvis for confirmation of diagnosis and to rule out other pathologies. Liver function tests and blood complete picture were performed in all patients. Chest X ray and cardiac evaluation were performed where indicated. A well understood informed consent was obtained from all patients keeping in mind all ethical issues. Patients were divided randomly in two groups of 40 patients in each. Group-A was for laparoscopic cholecystectomy and group-B was for open cholecystectomy. The operation time was calculated in minutes for both laparoscopic cholecystectomy and open cholecystectomy starting from making skin incision to last skin stitch applied. The time required for return of normal bowel activity after procedure was calculated in hours. Abdomen was auscultated for bowel sounds firstly after nine hours of procedure and then every three hourly till normal bowel sounds were audible. Patients were put on intramuscular nonsteroidal analgesics routinely 8 hourly for postoperative abdominal pain till patient was pain free and days for injectable analgesic requirement were recorded. Length of post operative hospital stay in days was recorded

for both groups. Rate of conversion from laparoscopic procedure to open procedure due to any reason was documented. Intra-operative complications like common bile duct injury, gallbladder perforation and uncontrolled hemorrhage in laparoscopic cholecystectomy and open cholecystectomy were also recorded. Visceral injury during port insertion in laparoscopic cholecystectomy was also recorded in the study.

Data analysis: Data was recorded on a proforma and entered into SPSS 10 database software for analysis. Mean ±S.D was calculated for numeric variables whereas frequency and percentages were calculated for categorical variables. t-test was used to compare both groups for operative time, return of normal bowel activity, days for postoperative injectable analgesics and post operative hospital stay. Chi-square test was used to compare intra-operative complication as gall bladder perforation, uncontrolled hemorrhage, *p* – value less than 0.05 was taken as significant.

RESULTS

Our study population was in age group of 25 to 65 years. Mean age of group A patient was 41.32 years (SD=10.66) whereas of group B has been 41.05 years (SD=9.41) (*p*-value 0.90). The 32 (80%) were female patient and 8 (20%) were male patients in LC group where as 34 (85%) were female patient and 6 (15%) were male patients in OC group.

In our study the mean duration of LC was 64 minutes (30-90 min) (SD=13.4) where as mean duration of OC was 37.12 minutes (25-70 min) (SD=9.6). The *p* value for these readings is 0.00 which is statistically significant. In our study return of bowel sounds in LC group were in mean of 12 hrs (9-18 hours) (SD=3.25) where as in OC mean was 16 hrs (9-30 hrs) (SD=4.75). In our study duration post operative stay in LC group patient has been 1.5 day mean (1-4 days) (SD=0.71). OC group mean post operative stay has been 2.9 days (2-5 days) (SD=0.84). The *p* value for these readings was 0.00 which is significant.

In our study mean duration of injectable analgesia in LC group has been 1.3 day (1-3 days) (SD=0.51) where as in OC group has been 1.8 days (1-3 days) (SD=0.7). The *p* value for these results was < 0.05 which is significant statistically.

In our study there was one common bile duct injury in LC group making 2.5 percent of group and none in OC group patients, *p*- value of these results is 0.368 which is statistically insignificant. In our study 15% of gallbladder were perforated during LC and 22% in OC procedure *p*-value of results is 0.39 which is statistically not significant There was no case of uncontrolled hemorrhage or visceral injury in both groups.

DISCUSSION

In group of patients who underwent laparoscopic cholecystectomy operative time was 64.37 minutes where as group of patients who had open cholecystectomy it was 37.12 minutes In study conducted by Smith JF et al mean operative time was 78.8 ± 1.8 minutes for laparoscopic cholecystectomy and 62.7 ± 2.6 min for open cholecystectomy[9]. In study conducted by Porter J et al median operation time for LC (75, 40-180 minutes) was significantly longer than for OC (55, 20-155 minutes;)[10]. In study conducted by Hardy KJ et al mean operating room time was 131 ± 3.7 minutes for OC and 164 ± 4.7 minutes for LC[11]. The time required for laparoscopic cholecystectomy in our study and other studies is longer as compared to open cholecystectomy and that is because of factors like setting up camera units, putting in ports, insufflation and mainly it is because of new technology utilization in adoption phase.

The mean time for which these patients remained hospitalized postoperatively was significantly lower in patients who underwent laparoscopic cholecystectomy as compared with open cholecystectomy.

Laparoscopic patients remained hospitalized for mean of 1.52 ± 0.71 days. While the other group patients stayed in the hospital for a mean period of 2.95 ± 0.84 days. In study conducted by Smith JF et al mean length of hospitalization was 1.58 ± 0.07 days for laparoscopic patients and 3.55 ± 0.11 days for open patients[9]. In study conducted by porter J et al postoperative hospitalization was significantly shorter after LC (3, 1-16 days), compared with OC (7, 4-22 days) [10].

In a study conducted by Hardy KJ et al mean duration of hospital stay was 6.5 ± 0.3 days for OC and 2.0 ± 0.2 days for LC[11].

In study conducted by Kelley JE et al postoperative hospital stay averaged 1.3 days for the LC group versus 3.7 days for the OC group[12]. In the study conducted by Sanabria et al the authors found significant differences in length of hospitalization (6.4 ± 4.2 days in the OC group, 3.6 ± 2.4 days in the OC-LC group and 2.4 ± 1.7 days in the LC group[13]. In the study conducted by Kiviluolo et al the postoperative hospital stay was significantly shorter in the LC than the OC group (median 4 [IQR 2-5] vs 6 [5-8] days). Mean length of sick leave was shorter in the LC group (13.9 versus 30.1 days;)[14].

In our study the results were similar with other studies showing that the hospital stay reduces significantly if the patients are managed with laparoscopic cholecystectomy rather than open cholecystectomy.

In our study the patients undergoing laparoscopic surgery required analgesic support for shorter period of time than the other group of patients undergoing open cholecystectomy. (Mean of 1.30 ± 0.51 days vs 1.85 ± 0.69 days).

In study conducted by Smith JF et al laparoscopic cholecystectomy patients required analgesia by a mean of 1.22 ± 0.03 days postoperatively compared to 2.55 ± 0.07 days postoperatively for those undergoing open cholecystectomy[9].

In study conducted by Hardy KJ et al amount and period of analgesia were significantly less in the LC group. Patients recovered significantly faster after LC during the first eight weeks after surgery. There was no difference by 12 weeks[11].

In our study in laparoscopic cholecystectomy group normal bowel activity, returned after a mean of 12.2 ± 3.2 hours. In study conducted by Smith JF et al the mean time for tolerating a regular diet was 1.23 ± 0.04 days in the laparoscopic group versus 2.44 ± 0.07 days in the open group[9]. The *p* value in our study was significant and shows that patients regain bowel activity quickly with laparoscopic procedure. This may be due to fact that there is less manipulation of gut and less postoperative pain which is more with open procedure because of retractors and use of sponges to retract gut and stomach and use of larger incision in open procedures.

Two patients out of forty needed to be converted from laparoscopic to open cholecystectomy. Both cases needed conversion due to difficult dissection. In study conducted by Smith JF et al thirty-one patients undergoing laparoscopic cholecystectomy were converted to open cholecystectomy (6.4%). The most common reasons for conversion to open cholecystectomy were acute inflammation, adhesions, and bleeding[9]. In study conducted by Porter J et al conversion of LC to OC occurred in 12 (12%) patients initially scheduled to undergo LC[10]. In study conducted by Hardy KJ et al the conversion rate of LC to OC was 4.5%[11]. In the study conducted by Sanabria et al nine patients (5%) with LC required conversion to OC[13]. In the study conducted by Kiviluolo et al five (16%) patients in the LC group required conversion to OC, in most because severe inflammation distorted the anatomy of Calot's triangle[14]. In our study there was one common bile duct injury in LC group and none in OC group patients. Patient presented after 5 days with biliary peritonitis. Laparotomy was performed. Linear rent of 1 cm

was found in common bile duct. T-tube was placed and after recovery from septicemia patient was referred for stenting of common bile duct.

In the study conducted by Targarona EM et al bile duct injury (BDI) incidence was higher in LC group (n: 16, 0.95%) than in OC group, (n: 19. 0.6%). BDI incidence was also higher in the group of patients in which it was necessary to convert to an open procedure (3/109, 2.7%, $p < 0.05$). Bile duct injuries were more frequently diagnosed intraoperatively in OC group (18/19) than in LC group (12/16)[15].

In the study conducted by Diamantis T there were 13 bile duct injuries associated with LC (0.62%) and 6 associated with OC (0.38%) . Only two (15.4%) of the BDIs associated with LC occurred within the proposed learning curve limit of 50 laparoscopic cholecystectomis per individual surgeon[16].

The incidence of this complication is more in studies which are conducted during learning period. With experience this incidence starts decreasing.

In our study 15% of patients undergoing laparoscopic cholecystectomy had gall bladder perforation during the procedure. While in open cholecystectomy 22.5% of the patients had intra-operative gall bladder perforation. In the study conducted by Assaff Y et al bile spillage occurred in 65 (34%) and gall-stones were "lost" in 27 (14%), 44 (23%) required conversion to an open approach and 36 (19%) developed complications[17]. Preoperative duration of symptoms >96 hours and a palpable gallbladder were associated with accidental perforation of the gallbladder and spillage of bile.In the study conducted by Kimura T et al intraoperative gallbladder perforation occurred in 29 of the 110 patients (26.3%)[18]. It was caused by injury with an electric knife during dissection of the gallbladder bed, injury during gallbladder retraction or extraction from the abdomen, and slippage of cystic duct clips (potentially causing bile and stone spillage). Perforation was more frequent in patients with positive bile cultures and in those with pigment stones but not in patients with cholecystitis or cystic duct obstruction. The peritoneal cavity was contaminated by bacteria in 11/29 patients (37.9%) and by spilled stones in 3/29 patients (10.3%). There was no difference in the incidence of postoperative complications between the patients with and without perforation either in the early postoperative period or during follow-up for 24-42 months. Only one patient developed abdominal pain and fever in the early postoperative period[17].

CONCLUSION

Open cholecystectomy has been superseded by laparoscopic cholecystectomy (LC) for the treatment of cholelithiasis. Laparoscopic cholecystectomy is associated with fewer complications than open cholecystectomy when performed in experienced hands. It has the benefit of easy recovery of the patient and less post operative pain as compared to open cholecystectomy and good cosmetic element because of small incisions.

REFERENCES

1. Endosurgery center: laparoscopic center [online] 2005 [cited 2005 November 17] Available from: http: // www.laparoendoscopy.com / choletutorial1. htm
2. Guraya SY, Khairy GA, Murshid KR. Audit of laparoscopic cholecystectomy: 5 years experience in a University Hospital. Ann King Edward Med Coll 2004; 10(1): 9-10.
3. Cuschieri A. How I do it. Laparoscopic cholecystectomy. R Coll Surg Edinb 2008 [cited 20058 May 20] Available from: http;//www.rcsed.uk/journal/vol44-3/4430046.htm.
4. Cuscheri SA. Disorders of biliary tract. Essential surgical practice.4th Ed. London: Arnold, 2007: 411-3.
5. Iqbal J, Ahmad B, Iqbal Q, Rashid A. Laparoscopic vs open cholecystectomy morbidity comparison. Professional Med J 2002; 9(3): 226-35.
6. Memon AA, Shah SP, Langah H,Ghumro AA. Early experience with laparoscopic cholecystectomy. J Surg Pakistan 2004; 9(3):2-5.
7. Salamah SAM. Outcome of laparoscopic cholecystectomy in acute cholecystitis. J Coll Physicians Surg Pak. 2005; 15(7): 400-3.
8. Tittel A, Schumpelick V et al. Laparoscopic surgery: Expectations and reality. Chirurg, 2001:72(3): 227-35.
9. Smith JF, Boysen D, Tschirhart J, Williams T, Vasilenko P, Comparison of laparoscopic cholecystectomy versus elective open cholecystectomy. J Laparoendosc Surg 1992; 2(6): 311-7.
10. Porte RJ, De Vries BC. Laparoscopic versus open cholecystectomy: a prospective matched-cohort study. HPB Surg. 1996; 9(2):71-5.
11. Hardy KJ, Miller H, Fletcher DR, Jones RM, Shulkes A, McNeil JJ. An evaluation of laparoscopic versus open cholecystectomy. Med J Aust. 2004; 160(2): 58-62.
12. Kelley JE, Burrus RG, Burns RP, Graham LD, Chandler KE Safety, efficacy, cost, and morbidity of laparoscopic versus open

cholecystectomy: a prospective analysis of 228 consecutive patients. Am Surg. 2003; 59 (1): 23-7.

13. Sanabria JR, Clavien PA, Cywes R, Strasberg SM. Laparoscopic versus open cholecystectomy: a matched study. Can J Surg. 1993; 36(4): 330-6.
14. Kiviluoto T, Siren J, Luukkonen P,Kivilaakso E. Randomised trial of laparoscopic versus open cholecystectomy for acute and gangrenous cholecystitis. Lancet. 1998; 351(9099): 321-5.
15. Targarona EM, Marco C, Balague C, Rodriguez J, Cugat E, Hoyuela C et al. How, when and why bile duct injury occurs. A comparison between open and laparoscopic cholecystectomy. Surg Endosc 1998; 12(4): 322-6.
16. Diamantis T, Tsigris C, Kiriakopoulos A, Papalambros E, Bramis J, Michail P et al, Bile duct injuries associated with laparoscopic and open cholecystectomy: an 11-year experience in one institute. Surg Today. 2005; 35(10): 841-5
17. Assaff Y, Matter I, Sabo E, Mogilner JG, Nash E, Abrahamson J, et al. Laparoscopic cholecystectomy for acute cholecystitis and the consequences of gallbladder perforation, bile spillage, and "loss" of stones. Eur J Surg 1998; 164(6): 425-31.
18. Kimura T, Goto H, Takeuchi Y, Yoshida M, Kobayashi T, Sakuramachi S et al. Intraabdominal contamination after gallbladder perforation during laparoscopic cholecystectomy and its complications. Surg Endosc 2007; 10(9):888-91.

.....