

COMPARISON OF SMALL-INCISION OPEN CHOLECYSTECTOMY VERSUS LAPAROSCOPIC CHOLECYSTECTOMY FOR PATIENTS WITH SYMPTOMATIC CHOLELITHIASIS

Muhammad Iftikhar¹, Jamshed Alam², Irfan Ul Islam Nasir³, Muhammad farooq¹

ABSTRACT

Objective: To compare the complications and symptomatic relief of the laparoscopic cholecystectomy (LC) with the small incision cholecystectomy (SIC) in patients with symptomatic Cholelithiasis.

Material and Methods: This comparative study was conducted in the Surgical Department of Peshawar Institute of Medical Sciences Hayatabad Peshawar from January 2014 to December 2014 total numbers of 157 patients, aged between 18-60 years, having symptomatic gallstones were enrolled from the Out Patients Department using purposive convenient sampling. Operation, anesthesia, analgesics and postoperative care were standardized and both Laparoscopic cholecystectomy (LC) and small incision cholecystectomy (SIC) were performed by the same group of surgeons. Complications and symptom relief were primary outcome measures, operative time and hospital stay were secondary outcome measures. The patients were followed up on 2 weeks, and 6 weeks postoperatively.

Results: Out of 157 patients, 80 underwent SIC and 77 underwent LC. Both groups were matched for age, gender, BMI, clinical findings and ASA grading. The mean duration of operation was 44 and 62 minutes in the SIC and LC groups, respectively ($p = 0.000$). LC was found to have shorter duration of hospital stay and return to regular activities as compared to SIC. Pain scores were the same in both groups while intra-operative and post-operative complications were slightly greater in LC group as compared to SIC group.

Conclusion: SIC is comparable to LC in terms of complication rate and symptomatic relief. It offers a good alternative in areas where LC facility or expertise is not available.

Key words: Cholelithiasis, Laparoscopic cholecystectomy, Small incision cholecystectomy, Common Bile Duct.

INTRODUCTION

Cholecystectomy is generally accepted as the treatment of choice for symptomatic gallstone disease and is one of the most frequently performed surgical procedures in the world. In 1882 Langenbuch¹ performed first successful procedure and more than a century later in 1980s, the preferred surgical technique for cholecystectomy changed from the classical open procedure to a smaller incision approach² and eventually Philip Mouret (1987) performed the first laparoscopic cholecystectomy.³ During the past two decades minimally invasive surgery flourished and laparoscopic cholecystectomy is now considered the gold standard

for removal of the gallbladder. Numerous studies, as well as a Cochrane Systematic Review, have reported a shorter hospital stay, shorter period of recovery, post-operative pain reduction, and better cosmetic results compared with open surgery.⁴

Small-incision (open) cholecystectomy (SIC) was introduced as another alternative to open cholecystectomy and indeed has also been shown to be associated with a shorter hospital stay (random effects 2.8 days; 95 % confidence interval) and quicker recovery time compared with open cholecystectomy in a Cochrane meta-analysis.⁵ Another systematic review comparing the three procedures - open, small-incision or laparoscopic cholecystectomy - showed no difference in mortality and complications; however, laparoscopic cholecystectomy and SIC were preferred over the conventional open cholecystectomy due to faster recovery times. To date, no clear difference could be shown between SIC and laparoscopic cholecystectomy.⁴ Despite the lack of evidence of superiority over SIC, the laparoscopic procedure is currently still the method of choice.^{4,5}

Importantly, the introduction of laparoscopic cholecystectomy has revolutionized the methods that surgeons currently use and due to further innovation of instrumentation and technology, minimally invasive

¹ Department of Surgery Institute of Medical Sciences Peshawar Pakistan

² Department of Surgery HMC Peshawar

³ Department of Surgery Naseer Teaching Hospital Peshawar

Address for correspondence:

Dr. Muhammad Iftikhar

Assistant Professor, General Surgery department, Peshawar Institute of Medical Sciences, Peshawar - Pakistan.

E-mail: iffi_khattak@hotmail.com

surgery has developed to even less invasive procedures. The conventional four trocars technique has progressed towards the three ports techniques and more recently the two ports procedure as well as to the introduction of the needlescopic cholecystectomy using small 2-mm instruments to reduce the discomfort from multiple incisions.^{6,7}

A review study conducted in 2008 showed that SIC has a shorter duration of operative time compared to LC with no significant difference detected between the two groups in terms of hospital stay, rate of switching to open surgery, complications, morbidity, mortality and postoperative outcome.⁵ In newer areas for laparoscopic techniques, advantages over previous practice are still under debate. However, true evidence of the superiority of LC to other procedures, such as small-incision cholecystectomy (SIC) and open cholecystectomy (OC), has yet to be assessed, as the newest technology and expertise is not available everywhere and specially in our part of the world where SIC is easy to perform with lower cost and also with less complication rate.

Our study aims at comparing SIC with LC as there is a consensus that the surgical cost of LC is significantly greater than OC and SIC. The reason is that LC requires expensive equipment, extensive expertise and it is harder to provide such equipment and devices in less developed countries with major obstacles in their healthcare system; this is an important issue requiring attention. In contrast to that SIC is easy to perform with no extra experience required in that field bearing less cost and with similar results.

METHODOLOGY

This was a comparative study conducted in the surgical department of Peshawar Institute of Medical Sciences from January 1, 2014, and Dec 31, 2014. Sample size was 157, 95% confidence level and 5% margin of error under WHO software for sample size determination. Purposive convenient sampling was done, patients were assigned into two groups "group "A" and group "B". In group A small incision open cholecystectomy was performed (n=80) and in group B laparoscopic cholecystectomy was performed (n=77).

Patients with symptomatic cholezystolithiasis (confirmed by ultrasonography), 18 years or older at recruitment, reasonable to good health (ASA score of 1 or 2), no known relevant allergies and signed informed consent letter were included in the study. Patients younger than 18 years, choledocholithiasis (icterus and/or bilirubin level of twice the upper limit of normal), cholangitis, known cirrhosis of the liver, known pregnancy, moderate to severe systemic disease (ASA score of 3 or higher), history of abdominal malignant neoplasm, obesity with $BMI > 45 \text{ kg/m}^2$ and previous upper abdominal surgery (precluding laparoscopic approach) were excluded from the study. Recovery after successful endoscopic treatment of choledocholithiasis

was not included in the exclusion criteria. Acute cholecystitis is a different disease with different complication rates, morbidity, and conversion rates and therefore was cause for exclusion.

All consultant surgeons participating in the trial had experience in LC and SIC. Operations were supervised by 1 of the consulting surgeons. Our hospital is a training hospital; thus, residents (from third year on) performed most of the operations, which enabled us to test external validity in a teaching hospital.

SIC was performed through an oblique right sub-costal incision. A 5-6 cm incision was made on the skin and after entering the abdominal cavity, the incision was expanded upto 8 cm, if necessary. At the end of surgery and after applying the sutures, the length of incision was measured again using a ruler. If the incision was longer than 8 cm or another procedure had been performed other than the cholecystectomy i.e. common bile duct exploration, the patient was excluded from the study. Duration of operation was calculated from the moment of surgery until the completion of skin suturing.

Level of pain was determined using the visual analogue scale (VAS) which was performed 24 hours after surgery. Patients had to be NPO for up to 12 hours post operatively and after that if the patients had no vomiting, a liquid diet was started for them and pain relievers were administered according to the VAS pain scale. The patients were followed up on 2 weeks, and 6 weeks postoperatively and Statistical Package for Social Sciences (SPSS) version 16 software was used for statistical analysis. In order to make quantitative comparisons, statistical t-test and chi-square test were applied using $p < 0.05$ as the level of significance after approval from the Hospital Ethical Committee.

If patients referred to the surgical outpatient department clinic met the inclusion criteria and no exclusion criteria were present, written informed consent was obtained. Patients were placed on the waiting list for elective cholecystectomy.

RESULTS

In this study, a total of 157 patients who underwent cholecystectomy for symptomatic gall stones were observed, divided into two groups, SIC group (80 patients) and LC group (77) patients with 12 (7.6%) male and 145 (92.4%) female patients (Table-1).

The mean operative time was found out to be 44 ± 16 minutes for SIC group and 62 ± 21 minutes for LC group with a highly significant P-value of 0.0000001. Pain was almost comparable in both groups with a mean on VAS of 4.3 ± 1.3 for SIC and 4.1 ± 1.1 for LC. Hospital stay and return to regular activity was shorter in LC group as compared to SIC group with a P-value of 0.0000001 and 0.000003 respectively (Table-2).

Major intra-operative and post-operative were

also recorded which were found slightly higher in the LC group as compared to SIC group. There was extensive bleeding intra-operatively in 3,3 patients in

both the groups which was controlled and hemostasis secured. Common Bile Duct was injured in 1, 1 patients in either group, who were re-operated and the injury

Table No 1: Demographic data

Groups	SIC	LC	P-Value
Total (%) n=157	80	77	
Male, n (%) 12	7	5	0.4096
Female, n (%)145	73	72	
Age (Years) 18-60	38 +/- 6 SD Years	37.5 +/- 6SD Years	0.6024

Table No 2: Operative and post-operative variables evaluated in both groups

Groups	SIC	LC	P-Value
Operative Time, mean +/- SD	44 min +/- 16 min	62 +/- 21 min	0.0000001
Pain (VAS), mean +/- SD	4.3 +/- 1.3	4.1 +/- 1.1	0.3006
Hospital Stay (day), mean +/- SD	73	72	
Return to activity, mean +/- SD	3.2 +/- 0.6	2.7 +/- 0.5	0.0000001
	7.3 +/- 2.5	5.7 +/- 1.5	0.000003005

Table No 3: Intra-operative and post-operative common complications

Groups	SIC	LC	P-Value
Intra-Operative	10	11	0.4622
Post-Operative	4	5	0.4759
Gall Bladder perforation	1	3	0.2958
Bleeding	3	3	0.6410
Conversion to open/Extending Incision	5	4	0.5241
CBD Injury	1	1	0.7420
SSI	2	1	0.5144
Atelectasis	2	4	0.3227

CBD- Common Bile Duct

SSI- Surgical Site Infection

was successfully treated (Table-3).

DISCUSSION

Gall bladder disease continues to be one of the most common digestive system disorders encountered by surgeons. Cholecystectomy in fact, is the commonest surgical procedure in the abdomen worldwide. Among the drawbacks of laparoscopic cholecystectomy cited in the introduction, it is pertinent to point out that surgeons already experienced in abdominal and biliary surgery still require being trained, credentialed and privileged to perform laparoscopic cholecystectomy but mini cholecystectomy does not require expensive technology and special skills, associated with less abdominal wall trauma, shorter hospital stay, early return to work and few complications.

For the past few years studies shows laparoscopic cholecystectomy is comparable to minicholecystectomy. The mini-laparotomy incision that just split the right rectus abdominal muscle is alternative to the laparoscopic technique,⁸ as was Seale and Ledet⁹ utilized a transverse incision 4-7cm long, in which rectus abdominal muscle was saved as much as possible, in their study 89% of the patients were discharged on the same day of operation with 12 hours of surgery with low 0.2% complication rate and 0.3% of them were re-admitted. Thomas et al¹⁰ also utilized a smaller incision (mean 8cm) in their study.

In our study the mean operative time was 44 ± 16 minutes for SIC and 62 ± 21 minutes for LC group, which is contrary to Ahmad et al¹¹, in whom study it came out to be 62 minutes for mini cholecystectomy with minimal blood loss and less complications.

Mini-cholecystectomy denotes suitable duration in surgery, smaller complications rate, lesser analgesic requirement, quicker recovery, excellent cosmetic results and relative cost-effectiveness.¹² Complication rate (both intraoperative and postoperative), symptom relief, conversion rate, and hospital stay were similar in both SIC and Laparoscopic Cholecystectomy but operative time was shorter in the SIC group. The results of this study compare well with those in the literature.

In our study the mean operating time for an small incision cholecystectomy is 30 to 60 minutes and for laparoscopic cholecystectomy 41 to 83 minutes in contrast to 90 minutes for SIC and 95 minutes for the laparoscopic procedure. Nevertheless, a comparison of complications based on groups of patients is not always apparent because of the differing exclusion criteria, periods of hospital stay, and definition of the term 'complication'. Usually, complications are classified as bile duct injury, vascular, trans-mural bowel injury, residual stones, wound or urinary tract infections, urinary retention, and ileus. Bile duct injuries has been more common after laparoscopic than open cholecystectomy.¹³ In the present study we had one case of bile duct injury in both the groups which was re-operated and the injury was successfully treated.

Trends in the duration of hospital stay for cholecystectomy have to be considered, indicating that for small incision open cholecystectomy no further reduction in postoperative hospital stay could be future goal at our hospital.

CONCLUSION

Laparoscopic and small-incision cholecystectomy is equivalent. No differences could be observed in mortality, complications, and postoperative recovery. Small-incision cholecystectomy has a significantly shorter operative time. Complications in LC are slightly higher than in SIC.

REFERENCES

1. Langenbuch C: Ein Fall von Exstirpation der Gallenblasewegenchonischer Cholelithiasis: Heilung. *Berliner KlinWochenschr* 1882, 19:725-727.
2. Dubois F, Berthelot B: [Cholecystectomy through minimal incision(author's transl)] Cholecystectomie par mini-laparotomie. *NouvPresse Med* 1982, 11:1139-1141.
3. Keus F, Gooszen HG, Van Laarhoven CJ. Systematic review: open, small-incision or laparoscopic cholecystectomy for symptomatic cholelithiasis. *Aliment Pharmacol Ther* 2009; 29:359-78.
4. Frederik Keus, Jolanda de Vries, Hein G. Gooszen, Cornelis J. H. M. van Laarhoven: Laparoscopic versus small-incision cholecystectomy: Health status in a blind randomised trial; *SurgEndosc* 2008; 22:1649-59.
5. Keus F, Gooszen HG, van Laarhoven CJ. Open, small-incision, or laparoscopic cholecystectomy for patients with symptomatic cholelithiasis. An overview of Cochrane Hepato-Biliary Group reviews. *Cochrane Database Syst Rev*. Jan 2010;(1):10.1002.
6. Rosenmüller MH, Thorén Örnberg M, Myrnäs T, Lundberg O, Nilsson E, Haapamäki MM. Expertise-based randomized clinical trial of laparoscopic versus small-incision open cholecystectomy. *Br J Surg*. 2013;100:886-94.
7. D. J. Gouma. Cholecystectomy: from open surgery to single-incision laparoscopic and transluminal endoscopic surgery. *Endoscopy* 2010; 42(5): 416-418.
8. Rozos I, Frenczy J, Schmitz R. Micro and minicholecystectomies in the 21st century. *Orv Hetil* 2003;144:1291-7.
9. Seale AK, Ledet JR. Minicholecystectomy a safe, cost effective Day Surgery Procedure. *Arch Surg* 1999;134:308-9.
10. Thomas S, Singh J, Bishnoi PK, Kumar A. Feasibility of day care open cholecystectomy, evaluation in an inpatient model. *ANZ J Surg* 2001;71:93-7.
11. Ahmad A, Khan HM, Gulshan S, Shah TA. Mini cholecystectomy: A comparison with laparoscopic cholecystectomy: *Ann King Edward Med Uni* 2005;11:387-8.
12. Khan N, Haleem A, Ahmed I, Jan A. Cholecystectomy through minilaparotomy incision, *Gomal J Med Sci* 2009;7:92-5.
13. Medeiros, AC, et al. Laparoscopic versus open cholecystectomy: complications and cost. *J Surg Clin Res* 2012:49-58.