

A Comparative Study of Open Cholecystectomy versus Laparoscopic Cholecystectomy- A Hospital Based Study

Anindita Bhar¹, Sagar Karmakar²

¹Associate Professor, Department of General Surgery, K.P.C. Medical College, Kolkata, West Bengal.

²Assistant Professor, Department of Ophthalmology, Burdwan Medical College, Burdwan, West Bengal.

ABSTRACT

BACKGROUND

Cholecystectomy has become the universal standard for treatment of cholecystitis. We conducted this study to find out the method of cholecystectomy to be chosen in a developing country like ours, where loss of working days is a major issue and also to find out if there is any advantage of laparoscopic cholecystectomy over open cholecystectomy.

METHODS

We retrospectively viewed medical records of 160 cholecystectomised patients within our study period and divided them in to two groups Group A (comprising of patients undergone laparoscopic cholecystectomy) and Group B (comprising of patients undergone open cholecystectomy). By this process each group comprised of 80 patients. Necessary data like age, gender, diagnosis (acute or chronic), duration of surgery, intra and post-operative complications, post-operative pain and analgesic use, drain output on 1st post-op day & duration of hospital stay were collected from hospital records. Both the groups were then compared on the basis of these data.

RESULTS

Mean age of study population was 41.41 ± 11.76 yrs. while that of Group A was 40.78 ± 11.90 and that of Group B was 42.02 ± 11.67 yrs. 31.25% of study population were male remaining being female. 32.50% in Group A and 30% in Group B were male. Group A had a significantly lower duration of surgery compared to Group B ($p < .0001$). Group A also had a significantly lower rate of post-operative complication ($p = 0.006$), lower 1st post-operative day drain output ($p < 0.0001$), lesser post-operative analgesic requirement ($p < 0.0001$), and a lower post-operative hospital stay ($p < 0.0001$).

CONCLUSIONS

With an experienced surgeon, laparoscopic cholecystectomy has become a procedure of choice compared to open cholecystectomy.

KEYWORDS

Cholecystitis, Laparoscopic Cholecystectomy, Open Cholecystectomy

Corresponding Author:

*Dr. Sagar Karmakar,
Flat 4a, Basera Apartment,
224/3, N.S.C. Bose Road,
Kolkata- 700047, West Bengal.
E-mail: sagarda123@gmail.com*

DOI: 10.18410/jebmh/2020/255

*Financial or Other Competing Interests:
None.*

How to Cite This Article:

Bhar A, Karmakar S. A comparative study of open cholecystectomy versus laparoscopic cholecystectomy- a hospital based study. J. Evid. Based Med. Healthc. 2020; 7(25), 1193-1197. DOI: 10.18410/jebmh/2020/255

*Submission 29-04-2020,
Peer Review 03-05-2020,
Acceptance 02-06-2020,
Published 19-06-2020.*



BACKGROUND

Benign diseases of the biliary tract are one of the most common surgical problems in the world. Gallstones specifically affects millions.¹ The term cholecystectomy denotes surgical removal of gall bladder. It is the most common major abdominal surgery performed in western countries, an important indication being recurrent biliary colic. Carl Langenbuch performed the first successful open cholecystectomy in 1882. Cholecystectomy can be performed by open and laparoscopic methods. In 1987 Philippe Moutet of France first introduced Laparoscopic cholecystectomy and which quickly revolutionised the treatment of gall stone.² During last several years laparoscopic cholecystectomy has emerged worldwide as a preferred treatment for patients with cholecystitis and cholelithiasis. Benefits of this approach includes reduced hospitalisation and associated cost, less pain, avoidance of larger incision with improved cosmetic outcome, earlier post-operative recovery and return to work.

Although laparoscopic cholecystectomy has largely supplanted traditional methods of performing open cholecystectomy for most patients with chronic uncomplicated cholecystitis and cholelithiasis, the open approach continues to be safe and effective therapy for complicated gall stone disease. There are a number of clinical situations that, when present make the laparoscopic approach more difficult and should prompt consideration of open approach.

In this study we will be comparing open and laparoscopic cholecystectomy on the basis of duration of the procedure, intra & post-operative complications, drain output on 1st post-op day, post-operative pain and analgesic requirement and duration of hospital stay.

METHODS

This retrospective study was conducted in Department of Surgery of K.P.C. Medical College from January 2014 to June 2015. We retrospectively viewed medical records of those patients who underwent cholecystectomy during the study period. Among them patients who matched with our inclusion criteria (mentioned below) were selected for our study and those having any of the exclusion criteria were rejected. Incomplete and missed data were also removed from analysis. The study population was then divided into two groups i.e. Group A and Group B. Patients subjected to Laparoscopic Cholecystectomy (LC) were grouped in Group A and those subjected to Open Cholecystectomy (OC) were in Group B. By this above mentioned method we selected 160 patients, of which 80 patients underwent laparoscopic cholecystectomy and was in Group A, while remaining 80 patients underwent open cholecystectomy and was grouped in Group B.

Inclusion Criteria

- Acute cholecystitis.
- Chronic cholecystitis.
- Cholelithiasis.
- Mucocoele & empyema of gall bladder.

Exclusion Criteria

- Choledocholithiasis.
- Carcinoma of gall bladder.
- Perforated gall bladder.
- Gangrenous gall bladder.
- Uncontrolled coagulopathy and end stage liver disease.

Data collected for our study population were age, gender, diagnosis (acute or chronic), duration of surgery, intra and post-operative complications, post-operative pain and analgesic use, drain output on 1st post-op day & duration of hospital stay.

Statistical Analysis

Data was presented as actual numbers and percentages, Epi Info and MedCalc software were used to find out statistical significance, p<0.05 was considered as significant.

RESULTS

The mean age of study population was 41.41± 11.76 yrs. with a range of 22 yrs. to 75 yrs., median age being 40 yrs. Mean age of Group A was 40.78 ± 11.90, ranged from 22 yrs. to 75 yrs., median 39 yrs. while mean age of Group B was 42.02± 11.67 yrs. with a range between 22 yrs. to 72 yrs., median 40 yrs. In Group A 49 (61.25%) patients were in age group of (20 to 40) yrs., 24 patients (30%) in (41 to 60) yrs. group while 7 (8.75%) of them were above 61 yrs. In Group B 43 cases (53.75%) were in the first group i.e. 20 to 40 yrs., 28 patients (35%) in 41 to 60 yrs. group and 9 (11.25%) were above 9 yrs.

Among the study population 50 patients (31.25%) were male and 110 (68.75%) were female while in Group A 26 (32.50%) were male and 54 (67.50%) female and in Group B it was 24 (30%) male and 56 (70%) female.

In Group A, 8 Patients (10%) had a history of acute cholecystitis for which they were operated while remaining 72 patients (90%) had chronic cholecystitis as an indication for their operation. In Group B, 5 patients (6.25%) had acute cholecystitis and 75 patients (93.75%) had chronic cholecystitis as indication for their operation.

Surgery/ Duration (min)	A (n=80)	B (n=80)
<60	24	0
60-90	53	10
91-120	3	56
>120	0	12
Mean	70.25 ± 15.78	107.18 ± 16.18

Table 1. Distribution of Study Population on the Basis of Duration of Surgery in Different Groups

Difference = 36.930, Standard error = 2.527, 95% CI =31.9392 to 41.9208, t-statistics = 14.615, DF = 158, p<0.0001 (Highly significant)

Table 1 shows mean duration of surgery in Group A (70.25 ± 15.78) is significantly less than that of Group B (107.18 ± 16.18).

Intra-Op Complication/ Group	Absent (%)	Present (%)	Total (%)
A (n=80)	71 (88.75)	9 (11.25)	80 (100)
B (n=80)	68 (85)	12 (15)	80 (100)
Total	139 (86.88)	21 (13.12)	160 (100)

Table 2. Distribution of Study Population on the Basis of Intra-Operative Complications in Different Groups

Gall stone spillage	5		
Bleeding	3		
CBD injury	1		
Gall stone spillage	4		
Bleeding	6		
CBD injury	2		

p(two tailed) = 0.320, df = 1, Non-significant

In table 2 we can see intra-operative complication is more in Group B (15%) compared to that in Group A (11.25%), but this is not statistically significant.

Post-Op Complication/ Group	Absent (%)	Present (%)	Total (%)
A (n=80)	75 (93.75)	5 (6.25)	80 (100)
B (n=80)	62 (77.50)	18 (22.50)	80 (100)
Total	137 (85.62)	23 (14.38)	160 (100)

Table 3. Distribution of Study Population on the Basis of Post-Operative Complications in Different Groups

Chest infection	1		
Wound infection	2		
Post-op ileus	2		
Chest infection	4		
Wound infection	8		
Post-op ileus	6		

p=0.006 (two tailed), df = 1

Significant

In table 3 we can see post-operative complication is more in Group B (22.5%) compared to that in Group A (6.20%), which is statistically significant.

Group	Mean± SD (ml)	Range (ml)	Median (ml)
A (n=80)	26.37 ± 24.60	0-100	20
B (n=80)	61.93 ± 41.53	0-150	50

Table 4. Distribution of Study Population on the Basis of 'Drain Output on 1st Post-Op Day' in Different Groups

Difference = 35.560, Standard error = 5.397, 95% CI = 24.9011 to 46.2189, t-statistics = 6.589, DF = 158, p<0.0001 (Highly significant)

Table 4 shows mean drain output on 1st post-op day in Group A (26.37 ± 24.60 ml) is less than that in Group B (61.93 ± 41.53 ml) and which was found to be statistically significant.

Group	A (n=80)	B (n=80)
1 to 2 (days)	69	7
3 to 4 (days)	10	48
5 to 7 (days)	1	20
>7 (days)	0	5
Mean of duration analgesic use in days	1.53 ± 0.87	4.17 ± 1.66

Table 5. Distribution of Study Population on the Basis of 'Duration of Post-Operative Analgesic Requirement (Days) in Different Groups

Difference = 2.640, Standard error = 0.210, 95% CI = 2.2261 to 3.0539, t-statistics = 12.599, DF = 158, p<0.0001 (Highly significant)

Table 5 shows mean duration of analgesic use after operation was much more in Group B (4.17 ± 1.66 days) compared to that in Group A (1.53 ± 0.87 days) and this was found to statistically significant.

Group	A (n=80)	B (n=80)
1 to 3 (days)	65	0
4 to 7 (days)	15	59
>7 (days)	0	21
Median of post-op hospital stay in days	2	5
Mean of post-op hospital stay in days	2.36 ± 1.40	5.91 ± 1.82

Table 6. Distribution of Study Population on the Basis of 'Post-Op Hospital Stay' in Different Groups

Difference = 3.550, Standard error = 0.257, 95% CI = 3.0430 to 4.0570, t-statistics = 13.828, DF = 158, p<0.0001 (Highly significant)

Table 6 shows mean duration of post-op hospital stay was much higher in Group B (5.91 ± 1.82 days) compared to that in Group A (2.36 ± 1.40 days) and which was found to be statistically significant.

DISCUSSION

Cholelithiasis is one of the most important surgically correctable disease. Though open cholecystectomy was the main stay of treatment in past, in recent time laparoscopic cholecystectomy has replace it widely. In several studies it has been seen that there are many advantages in laparoscopic cholecystectomy over open method such as reduced operative time, less intra and post-operative complications, less post-operative pain and a shorter hospital stay and for which now a days many surgeons are adopting this procedure. Even patients are now more inclined to laparoscopic cholecystectomy due less pain, early mobilisation and better cosmetic result.^{3,4,5}

No age or sex is immune to gallbladder disease, however we found in our study that 68.75% of study population was female, ratio of male: female being 1: 2.2. We also found that gall bladder disease is more common in 3rd and 4th decade with a mean age of 41.41 ± 11.76 yrs. Several authors in their studies have come across more or less similar findings e.g. Dhaigude et al in their study found a mean age of 39.03 yrs. in open and 33.13 in laparoscopic cholecystectomy with a male: female ratio of 1:1.96 while study by Parambil SM et al revealed mean age as 44 ± 13.33 yrs. and a male to female ratio of 1:2.^{6,7} The reason for high incidence among females could be that pregnancy and childbirth have a definitive influence on biliary tract disease, acting by causal stasis as well as weight gain and consequent hypercholesterolemia. Another reason may be the effect of female hormones i.e. oestrogen and progesterone, especially progesterone reducing motility of gall bladder to cause stasis leading to gall stone formation.

Our study revealed a shorter mean duration of surgery in patients undergone laparoscopic cholecystectomy i.e. Group A (70.25 ± 15.78) compared to patients who were subjected to open cholecystectomy) i.e. Group B (107.18 ± 16.18) and was found to be statistically significant. Study by Waldner H et al revealed that there was no significant difference in duration of surgery in laparoscopic and open cholecystectomy, while studies by several other authors such as Pramod Singh et al (44.7 versus 72.4 min), Pessaux P et al (103.3 min vs. 149.7 min) Doke A. et al and Jaswant Jain et al found a shorter duration of surgery in laparoscopic

cholecystectomy compared to open cholecystectomy which was in agreement with our study.^{8,9,10,11,12} Contrary in various studies e.g. by Porte RJ et al (75 min vs. 55 min), Lujan JA et al (88 min vs. 77 min) a longer duration for laparoscopic compared to open cholecystectomy has also been encountered.^{13,14} This was probably due to surgeons being more conversant with laparoscopic operations (by training, retraining and performing more numbers of laparoscopic surgeries on a daily basis) generally require less time for performing such operations.

Our study revealed that intra-operative and post-operative complications are both more in Group B (15% and 22.5%) compared to that in Group A (11.25% and 6.20%). While this association was found statistically significant ($p=0.006$) in case of post-operative complications, it was non-significant ($p=0.320$) in intra-operative group. In case of intra-operative complications we found out of 9 patients having complication in Group A, 5 had gall stone spillage, 3 had bleeding and only one patient had a CBD injury while in Group B a total of 12 patients had complications of which 4 had gall stone spillage, 6 had bleeding and 2 had CBD injury. Post-operative complications were noted in 5 patients of Group A of which 1 had chest infection 2 had wound infection and 2 had post-op ileus while 18 patients of Group B had some sort of post-operative complications of which 4 patients had chest infection 8 patients had wound infection and 6 patients had post-op ileus. These findings can be explained from the fact that a sub costal incision was used in open group and presence of which with associated pain inhibits respiratory movement leading to atelectasis and pulmonary infection again hematoma associated with such incision can act as nidus for infection leading to wound infection.

Similar to our study several authors such as Karim T et al, Ajay Gangji et al, and Lujan JA et al showed a higher rate of complication in open cholecystectomy group compared to laparoscopic group.^{15,16} Though Lujan et found that the association of lesser complications in laparoscopic cholecystectomy group was not statistically significant ($p=0.06$) there are many other authors such as Doke A et al and Medeiros AC et al found a statistically significant ($p<0.05$) lower rate of complications in laparoscopic group compared to that in open group.¹⁷ Doke A et al showed in their study 28% complication (bleeding-3, wound infection-4) in Open group compared to 16% (bleeding -3, wound infection-1) in laparoscopic Cholecystectomy while Medeiros AC et al found 2.9% complication in laparoscopy group (wound infection -6, bile duct injury-1) and 5.13% in open group (wound infection - 13, Bile duct injury-2 and chest infection 2).

In this study we routinely placed a closed tube drain in sub-hepatic space and output was measured. This provided an egress of the collected blood (if any) and also used to monitor post-operative bleeding and evacuate collected irrigation fluid. In addition the closed tube drain placed after laparoscopic cholecystectomy may have a role in decreasing post-operative shoulder pain by allowing the remaining CO₂ gas to escape. Ultimately it was removed when nothing

came out through it. When mean drain output on first post-operative day was compared in among both the groups i.e. Group A and Group B we found that it was significantly more in Group B (61.93 ± 41.53 ml) compared to that in Group A (26.37 ± 24.60 ml).

Our study revealed that the mean duration of analgesic use after operation was significantly more in Group B (4.17 ± 1.66 days) compared to that in Group A (1.53 ± 0.87 days). It is further to be noted that 86.25% patients in Group A needed analgesic for only 1 to 2 days. In our study we also found that post-operative hospital stay was significantly longer in Group B (5.91 ± 1.82 days) compared to that in Group A (2.36 ± 1.40 days) of which 81.25% patients in Group A were discharged within 3 days.

Similar to our study Hardy KJ et al in their study revealed a significant longer mean hospital stay of 6.5 ± 0.3 days in open cholecystectomy group compared laparoscopic cholecystectomy group (2 ± 0.2 days).¹⁸ Chan HS et al recorded that laparoscopic cholecystectomy patients require significantly less analgesia ($p<0.01$) and significantly shorter mean post-operative stay (3.5 days vs. 5.9 days).¹⁹ Several other authors e.g. Hendolin HI et al Anmol N et al recorded similar findings.^{20,21}

CONCLUSIONS

Laparoscopic cholecystectomy is safe and efficacious in the hands of experienced surgeons. There is a definitive learning curve for surgeons and complications rate reduces as surgeons become more and more familiar with this procedure. It offers definitive advantages (e.g. shorter duration of surgery, less intra and post-operative complications, less analgesic use, early discharge and mobilisation) over open cholecystectomy and should be an available option for all patients requiring elective cholecystectomy.

REFERENCES

- [1] Russell RCG, Williams NS, Bulstrode CJK. Bailey and Love short practice of surgery. 24th edn. London: Hodder Arnold 2004.
- [2] Oddsdottir M, Pharm TH. Gall bladder and the extra hepatic biliary system. In: Brunicaudi FC, Andersen DK eds. Schwartz's principles of surgery. 9th edn. USA: McGraw-Hill Professional 2009:1151-1152.
- [3] Goco IR, Chambers LG. Dollar and cents: minicholecystectomy and early discharge. *South Med J* 1988;81(2):161-163.
- [4] Rajabi-Mashhadi MT, Abdollahi A, Tavassoli A, et al. Laparoscopic cholecystectomy: a retrospective four-year study. *J Minim Invasive Surg Sci* 2015;4(2):e25253.

- [5] Shukla A, Seth S, Ranjan A. A comparative study between laparoscopic and open cholecystectomy in cases of cholecystitis with cholelithiasis: one year experience in tertiary care center. *Int Surg J* 2017;4(3):903-907.
- [6] Dhaigude BD, Chaturvedi V, Chand A, et al. A comparative study of open versus laparoscopic cholecystectomy. *Indian J Appl Res* 2016;6(4):22-24.
- [7] Parambil SM, Matad S, Soman KC. Epidemiological demographic and risk factor profile in patients harbouring various types of gall bladder calculi: a cross sectional study from a south Indian tertiary care hospital. *Int Surg J* 2017;4(2):525-528.
- [8] Waldner H, Mussack T, Drzezga W. Laparoscopic versus open cholecystectomy in acute cholecystitis Langen Becker. *Arch Chir Suppl* 1997;144:1177-1779.
- [9] Singh P, Gupta SK, Kumar M. A comparative study of open cholecystectomy and laparoscopic cholecystectomy in patients with cholelithiasis. *Int Surg J* 2018;5(1):253-256.
- [10] Pessaux P, Regenet N, Tuech JJ et al. Laparoscopic versus open cholecystectomy: a prospective comparative study in the elderly with acute cholecystitis. *Surg Laparosc Endosc Percutan Tech* 2001;11(4):252-255.
- [11] Doke A, Gadekar N, Gadekar J, et al. A comparative study between open versus laparoscopic cholecystectomy. *Sch J App Med Sci* 2016;4(1):57-61.
- [12] Jain J, Gajbhiye SK. A study to assess the different methods of surgically treating cholecystitis due to cholelithiasis. *Indian Journal of Research* 2019;8(9):18-19.
- [13] Porte RJ, De Vries BC. Laparoscopic versus open cholecystectomy: a prospective matched cohort study. *HPB Surg* 1996;9(2):71-75.
- [14] Lujan JA, Parrilla P, Robles R, et al. Laparoscopic cholecystectomy versus open cholecystectomy in treatment of acute cholecystitis: a prospective study. *Arch Surg* 1998;133(2):173-175.
- [15] Karim T, Kadyal A. A comparative study of laparoscopic vs. open cholecystectomy in a suburban teaching hospital. *J Gastrointest Dig Syst* 2015;5:371.
- [16] Gangji A, Porwal M, Gupta A, et al. Comparative study between laparoscopic and open cholecystectomy in respect of postoperative recovery and hospital stay. *Journal of Evolution of Medical and Dental Sciences* 2014;3(5):1089-1096.
- [17] Medeiros AC, Araújo-Filho I, Carvalho MDF, et al. Laparoscopic versus open cholecystectomy: complications and cost. *Journal of Surgical and Clinical Research* 2012;3(2):49-58.
- [18] Hardy KJ, Miller H, Fletcher DR, et al. An evaluation of laparoscopic versus open cholecystectomy. *Med J Aust* 1994;160(2):58-62.
- [19] Chan HS, Ha XF, Ooi PJ, et al. A prospective comparative study between conventional and laparoscopic cholecystectomy. *Singapore Med J* 1995;36(4):406-409.
- [20] Hendolin HI, Paakkonen ME, Alhava EM, et al. Laparoscopic or open cholecystectomy: a prospective randomised trial to compare postoperative pain, pulmonary function, and stress response. *Eur J Surg* 2000;166(5):394-399.
- [21] Anmol N, Lakshminarayan G, Manohar TM, et al. Outcome following open and laparoscopic cholecystectomy. *Journal of Evolution of Medical and Dental Sciences* 2014;3(15):4061-4071.