**ORIGINAL ARTICLE**

# Comparison of Early Morbidity in Open and Laparoscopic Cholecystectomy for Treatment of Chronic Gallstones Disease

ISHTIAQ AHMED[1], SHEHZAD BASHiR[2], ZAFAR ALI CHOWDRY[3], *ADNAN RIAZ[4]*
*[1]SR Surgery, Khawaja Muhammad Safdar Medical College Sialkot*
*[2]Associate Professor Surgery, Khawaja Muhammad Safdar Medical College Sialkot*
*[3]Vice Chancellor, Faisalabad Medical University Faisalabad*
*[4]SR Surgery, Islam Medical College, Sialkot*
*Correspondence to Dr. Ishtiaq Ahmed, Email drishtiak@hotmail.com, Cell: + 92 – 322 – 4396815*

## ABSTRACT

**Background:** Cholelithiasis is a major health problem through out the world. Traditional open cholecystectomy has long been accepted as gold standard treatment of gallstones. Introduction of laparoscopic cholecystectomy has dramatically changed the management of the patients with gallstones disease. There is significant increase in total number of gall bladder procedures performed laparoscopically.
**Aim:** To compare morbidity in open and laparoscopic cholecystectomy in terms of per-operative iatrogenic injury to abdominal structures, early post operative complications, duration of procedure and stay in Hospital.
**Methodology:** It was a quasi-experimental study conducted at Department of General Surgery, Sir Ganga Ram Hospital Lahore. Total 100 patients diagnosed as chronic gallstones diseases were included in study and they were randomly distributed to group A (LC) and group B (OC), 50 in each group. Both groups were almost equal for demographic data. Group A was subjected to standard 4 ports laparoscopic cholecystectomy and group B was subjected to open cholecystectomy through standard right sub-costal incision.
**Results:** There were 50 patients in group A, mean age was 44.55 yrs. (SD±8.71) and 8(16%) were male and 42(84%) were female, while 50 patients were in group B with mean age 46.83 yrs. (SD±9.71) and there were 9(18%) male and 41(82%) female. Post operative hospital stay in group A was 1-5 days, mean 1.6 days (SD±1.7248) in group B while 2-7 days, mean 2.9 days (SD±2.0009) in group B. P-value = 0.012. In both the groups no per operative iatrogenic injury to CBD and duodenum was detected (0%). Duration of procedure in group A was 30 to 120 min. (mean 63 min.), while in group B it was 40 to 125 minutes (mean 61 min.). Wound infection was noted in 2(4%) patients in group A and 5 (10%) patients in group B. P-value is =0.727.
**Conclusion:** Laparoscopic cholecystectomy is an effective and safe technique of treating symptomatic gallstones in experienced hands as compared to open cholecystectomy because of accelerated recovery, negligible wound infection and wound related complications, less post operative pain and short hospital stay.
**Keywords:** Chronic gallstones disease, laparoscopic cholecystectomy, open cholecystectomy, morbidity.

## INTRODUCTION

Cholelithiasis is a major health problem through out the world and it is predominantly a female disease[1]. As a cause of hospitalization it is the most common and costly digestive disease[2]. Prevalence of gallstones makes cholecystectomy the second most common intra abdominal operation (after appendecectomy)[3].

Carl Johann Langenbuck performed first open cholecystectomy on July 15th 1882 in Germany. Glenn documented cholecystectomy as safe surgical procedure in 1940s and 1950s, when cholecystectomy became the gold standard for the treatment of gallstones[4].

Laparoscopy has been employed by gynaecologists and surgeons since the early 1900s. Kelling in Dresden first used laparoscopy utilizing a cystoscope to observe intra abdominal organs of dog and later several others contributed to its clinical application[5]. The timing was right in late 1980s for an effective less invasive way of eliminating gallstones. Mouret from France performed first laparoscopically assisted cholecystectomy in 1989. Almost simultaneously Dubois in France and Mckernan and Saye in Georgia performed first complete laparoscopic cholecystectomy as currently performed[5].

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Since first laparoscopic cholecystectomy in Pakistan in 1991, it has been enthusiastically accepted. Laparoscopic cholecystectomy has become an established procedure due to less pain, shortened post operative hospitalization and minimum morbidity[3]. It provides early ambulation and return to activity with minimal scarring[8].

There are a few disadvantages inherent in lap chole like lack of tactile perception, two dimensional views, the delicate instruments and indirect control of bleeding[6]. One must also consider the possibility of tumor implantation at laparoscopic port sites in the case of unsuspected gallbladder carcinoma during the operation[7]. Identification of structures during laparoscopic cholecystectomy is also very important to prevent iatrogenic injuries[8]. In our set up besides surgical access, more morbid anatomy, late presentation, different nature of biliary calculi and certain other factors like age, sex and co-morbid disease may have a significant impact and influence on perop and postop morbidity[3].

Emergency LC for the management of acute cholecystitis is conventionally considered to be associated with more complications and increased risk of common bile duct injury. With improvement in expertise and progression of learning curve, some surgeons have recommended LC as preferred treatment of acute cholecystitis[9]. Conversion to open technique is considered a major morbidity of LC as it loses its supremacy over open technique once the

conversion takes place[7].

Laparoscopic cholecystectomy replacing open cholecystectomy is now performed in more than 80% of patients surgically treated for symptomatic gallstones. The mortality rate after open and laparoscopic cholecystectomy is 0.5% and 0.014% respectively whereas the respective morbidity rates are 15% and 0.14%-0.65%[10].

Laparoscopic cholecystectomy has become preferred method now a days and the purpose of study is to compare both techniques regarding per-operative iatrogenic injury to duodenum and common bile duct, duration of procedures, early post operative complications and duration of stay in hospital to find out the morbidity of both the techniques in an institute where these procedures are performed routinely.

The objective of the study is to compare morbidity in open and laparoscopic cholecystectomy in terms of per-operative iatrogenic injury to abdominal structures, early post-operative complications, duration of procedure and stay in Hospital.

**Hypothesis:** The Laparoscopic cholecystectomy is superior to traditional open cholecystectomy due to low morbidity.

## MATERIAL AND METHODS

It was a quasi experimental study which was conducted at Department of General Surgery Sir Ganga Ram Hospital Lahore. Study was completed over a period of 12 months after approval of synopsis from 22-08-07 to 21-08-08. Total 100 patients were included, 50 in each group. Convenience non probability sampling technique was used. All the patients admitted with chronic gallstones disease were included. Patients with acute cholecystitis, choledocholithiasis, malignancy, cirrhosis of liver, severe cardiopulmonary disease< pregnancy, previous upper abdominal surgery and ventral hernia following co-morbid conditions were excluded.

All the patients who fulfilled the inclusion and exclusion criteria were included in this study. These patients presented with off and on onset of right hypochondrial pain for long periods associated sometimes with fever, nausea and vomiting.

These patients were admitted and investigated thoroughly. Complete blood count, complete urine examination, liver function tests, and ultrasonography of the abdomen was carried out in addition to measuring blood sugar level, ECG and chest X ray where indicated for anaesthesia.

Informed consent was obtained regarding surgery. These patients were subjected to cholecystectomy (open/ laparoscopic). Before operations these patients were randomly allocated to group A (LC) and group B (OC).

Open procedures were performed through standard Kocher's right subcostal incision and laparoscopic procedure was performed through standard four ports approach with open pneumoperitoneal technique. All operations were done successfully.

For group B, a non vacuum tube drain was placed in the right sub hepatic space through a separate stab incision, lateral to the original incision in open procedures and through one of the 5mm port site in the laparoscopic procedures.

Three doses of antibiotics intravenously (third generation cephalosporins) were given to each patient in both groups, one at the time of induction of anesthesia and two doses post operatively. Every patient was given non opiod analgesic (NSAIDs) IM twice a day and opiod analgesic (Inj. Nalbuphine 10mg diluted IV) on SOS basis. The drains were usually pulled out after 24 hours, depending upon the quality and quantity of drain fluid.

All operations were performed by consultant surgeons or senior residents under their direct supervision, all having sufficient skill and experience in both types of procedures. The patients who underwent LC initially but due to any difficulty converted to OC were not included in the study.

Patients in both the groups were observed per operatively for iatrogenic injury to CBD and duodenum, duration of procedure and post operatively for wound pain according to verbal rating scale (none, mild, moderate, severe), biliary leakage (appreciated in drain), wound infection (on evidence of cellulitis around the wound and purulent discharge from the wound and systemic signs and symptoms), jaundice (observed clinically) and post operative stay in hospital. Patients were discharged according to the clinical response.

Data were collected on follow up visits as well regarding wound pain, wound infection and jaundice and a proforma given below was filled.

All these data were tabulated and analyzed by SPSS version 11.0. Descriptive statistics like mean±SD, frequency and percentage were measured.

## RESULTS

Out of a Total 100 patients studied, 50 underwent LC (group A) and 50 OC (group B). Both the groups were comparable in age and sex distribution. The age of the patients ranged from 24 to 73 yrs. with maximum number of patients presenting in 4$^{th}$ and 5$^{th}$ decade (i.e.59 patients). The mean age for group A was 44.5 yrs. (SD) and group B was 46.8 yrs. (SD). The male to female ratio for group A was 1:5.2 and for group B 1:4.5. In group A, 8 (16%) were male and 42 (84%) were female. While in group B, 9 (18%) were male and 41 (82%) were females (Table 1).

In both the groups no per operative injury to CBD or duodenum was appreciated. Mean operative time in group A was 63 min. (SD) ranging from 35 to 120 minutes, while in group B mean operative time was 61 min. (SD) ranging from 40 to 125 minutes (Table 3).

Biliary leakage was recorded in 1(2%) case of group A patients (SD), while in group B no case of biliary leakage was recorded post operatively (0%). Port site infection was noted in 2(4%) patients (SD) in group A and in group B, 5 (10%) patients (SD) noted to have wound infection.

Mean post operative stay in hospital in group A was 1.6 days (SD±8.71) ranging 1-5 days. While in group B, the mean duration of stay was 2.9 days (SD) ranging 2-7 days (Table 2).

Two patients in group A remained admitted postoperatively up to 11 days who developed increased drain out put, one containing blood and the other bile. While one patient in group B who underwent re-laprotomy was discharged on 13$^{th}$ post operative day. All these

patients were given antibiotics and local wound management and they did well.

One patient in group B developed generalized biliary peritonitis. Re-laprotomy was done; all toxic material was washed out. Leaking bile was found from an accessory duct in the hepatic bed. The duct was suture ligated and subhepatic space drained. The patient got well and discharged on 13th post operative day. No patient underwent re-laparotomy in group A.

Table-1 Gender distribution

| Gender | Group A | | Group B | |
|---|---|---|---|---|
| | Frequency | %age | Frequency | %age |
| Male | 08 | 16 | 09 | 18 |
| Female | 42 | 84 | 41 | 82 |

Table-2 Age distribution

| Group | Mi-Max Yrs | Mean (years) | SD |
|---|---|---|---|
| A | 24-72 | 44.5 | ± |
| B | 30-73 | 46.8 | ± |

Table 3: Duration of procedures

| Group | Mi-Max (minutes)s | Mean (minutes) | SD |
|---|---|---|---|
| A | 35-120 | 63 | ± |
| B | 40-125 | 61 | ± |

Table 4: Per Operative Iatrogenic injury

| Group | N | Injury to CBD | Injury to duodenum | %age |
|---|---|---|---|---|
| A | 50 | 0 | 0 | 0% |
| B | 50 | 0 | 0 | 0% |

Table 5: Biliary Leakage

| Group A | | Group B | |
|---|---|---|---|
| Frequency | %age | Frequency | %age |
| 1 | 2% | 0 | 0% |

Table 6: Wound Infection

| Group A | | Group B | |
|---|---|---|---|
| Frequency | %age | Frequency | %age |
| 2 | 4% | 5 | 10% |

Table-7 Post Operative hospital stay

| Group | Mi-Max | Mean Days | SD |
|---|---|---|---|
| A | 1-5 | 1.6 | ± |
| B | 2-7 | 2.9 | ± |

Table 8 Post Operative Jaundice

| Group A, n=50 | | Group B, n=50 | |
|---|---|---|---|
| Frequency | %age | Frequency | %age |
| 0 | 0 | 0 | 0 |

## DISCUSSION

Cholelithiasis and cholecystitis are the most common disorders affecting the biliary tract. The prevalence of the gall stones makes the cholecystectomy a very common intraabdominal operation. Today LC is considered as the treatment of choice for gallstones disease, especially the chronic gallstones disease[11].

Since its introduction two decades ago, LC has become one of the most common general surgical operations performed (west ind med j). Recently there has been a trend towards outpatients LC. Today, the only absolute contraindication to LC is gallbladder carcinoma but relative contraindications include acute cholangitis, portal hypertension, pregnancy and major bleeding diathesis. The goal of both laparoscopic and open technique is to safely remove the gallbladder with low mortality, little morbidity and early recovery[17].

In our study, the patients undergoing elective (0pen/laparoscopic) cholecystectomy for chronic gallstones disease were included. Majority of the cases belonged to female sex (83%). This figure is higher than the figures of (70.6% females) Panpimanmas et al (R) and slightly lower than Dholia KR et al () (85%). The age of the patient in this study ranged from 24-73 years (mean age for LC 44.5 years and mean age for OC 46.8 years) is less than reported by Jitea N et al (51.2 years) and slightly higher than Dholia KR et al (42 years). The maximum number of patients presented in the 4th and 5th decade of life (59%). Male to female ratio for LC was 1:5.2 and for OC it was 1:4.5. International data supports our findings that gallstones are common in the females in her forties.

The results show that average operating time for LC was 63 minutes. Although operating time was longer than that for OC (61 min.), the difference was not significant.

In a study by Lewis RT[29], on drainage of simple cholecystectomy, post operative hospital stay was similar in patients with and without drain. Kriplani AK[24] showed that the post operative hospital stay was almost equal in drainage and non drainage group (4.22 vs. 4.26 days). This almost equal hospital stay in both groups was probably because of inclusion of elective cases in these studies.

The incidence of wound infection in our study was greater in drainage group as compared to non drainage group (10% vs. 8%, P-value=0.272). But this difference was not significant statistically.

International data also support our findings. Lewis[29] showed in a study the incidence of wound infection in drainage and non drainage group 8% vs 6% and it was not significant. al-Afraj[25] and associates have shown increased incidence of wound infection in drainage group but this difference was statistically insignificant.

In national studies also, the difference in the incidence of wound infection was insignificant in drainage and non drainage groups. Dar MS[27] found lower rate of wound infection (not significant) in the undrained group.

Trudeson[30] and associates found growth of bacteria in 46% cases in drainage fluid. They also noticed growth of similar bacteria from bile as from drain fluid. They concluded that as with increased incidence of bacteria in the gallbladder in acute cholecystitis, these cases are better served with intraperitoneal drain.

Dubecz[28] found higher incidence of wound infection when drain was brought out through the main wound as compared to when it was brought out through a separate incision (8.5% vs 3.2%). Mellor[29] found higher rate of wound infection with the use of open drains.

Postoperative pyrexia measured on the second postoperative day in both groups was significantly low in drainage group in our study (mean 98.7˚ F vs. 99.2˚ F, P-value =0.50). While international data shows increased

incidence of postoperative pyrexia in drainage group in some studies.

Saad AM[19] showed significantly high incidence of pyrexia in drainage group (28% vs. 10%). Diaz[31] showed increased incidence of pyrexia in drainage group (54% vs 16%). But temperature has not been quantified in these trials. The low grade fever may be due to response of the body to surgery in the early postoperative period. While Truedson H[32] found no difference in both groups regarding postoperative pyrexia and Forster R[33] also showed similar results.

In our study USG examination of abdomen for subhepatic collection on the second post operative day, showed significantly high volume in non drainage group (mean 48.9 ml vs. 14.9 ml, P-value=0.009).

International data also supports our finding. Kriplani AK[24] in a prospective USG study showed significantly lower incidence of post cholecystectomy collection and need for invasive intervention for collection related complications in drainage group (26% vs 42%).

Kapoor *et* al[34] showed that subhepatic collections were seen on ultrasonography after 48 to 72 hours in 34% patients with drainage and 57% patients without drainage (P<0.05). Maull[35] found that in the drained group, detectable subhepatic fluid was seen in 5 % of patients, whereas it occurred in 20% of nondrained patients (P<0.05).

In our study eight patients (16%) from group B developed significant collection (>75ml) and none from group A developed collection >75ml. These eight patients (16%) in non drainage group were subjected to percutaneous needle aspiration under USG control, while none in drainage group was subjected to such intervention. Kriplani[24] found similar results in this regard.

In drainage group, one patient developed continuous drainage of blood which was managed conservatively. This finding was same as made by Dubecz[28]. While three patients developed drainage of pure bile (biliary fistula). In patients with biliary fistula, ERCP was done on one patient and stent was placed and other two were managed conservatively and no relaparotomy was needed. Drains were found of great help in diagnosing such cases and their subsequent management[28].

While one patient in group B developed biliary peritonitis and re-laprotomy was done. Leak from an accessory cystohepatic duct (Luschka's duct) was found and the duct was suture ligated. Balija[36] showed this type of anomaly as the most common type in patients developing biliary leak. According to Spanos[37], ligation of the duct and drainage of subhepatic space is sufficient treatment.

## CONCLUSION

From the results shown in our study, the postoperative hospital stay is lowered significantly and postoperative complications like wound infection and postoperative pyrexia are lessened similarly with drainage of subhepatic space.

Intraabdominal collections are reduced significantly and the collection related complications and invasive interventions for their management can be avoided by this technique. Relaparotomies are also avoided by this policy.

It is reasonable to conclude that routine drainage of subhepatic space after early cholecystectomy for acute cholecystitis is very safe and very useful. The subhepatic space should be drained using close, non suction drain system and the drain should be brought out through a separate stab in the abdominal wall.

As there is a small sample size in our study it is recommended that larger trials should be carried out to rationalize this approach.

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