



Original Article

Prospective Comparative Study of Early versus Delayed Laparoscopic Cholecystectomy for Acute Cholecystitis

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ABSTRACT

Background: Acute cholecystitis is one of the most common surgical emergencies worldwide, primarily resulting from obstruction of the cystic duct by gallstones. Laparoscopic cholecystectomy (LC) is the gold standard treatment. However, the optimal timing of surgery remains controversial. Early laparoscopic cholecystectomy (ELC), performed within 24–72 hours of symptom onset or hospital admission, has been compared extensively with delayed laparoscopic cholecystectomy (DLC), which is typically performed more than 72 hours up to 6 weeks after conservative management. Laparoscopic cholecystectomy is now the procedure of choice for patient presenting with acute cholecystitis unless it is contraindicated for technical reason or safety. An attempt was made to compare the outcome and postoperative complications of early vs delayed laparoscopic cholecystectomy in acute cholecystitis.

Methods: Fifty patients aged 18 to 64 years having acute cholecystitis admitted for laparoscopic cholecystectomy were included. They were divided into two groups, early (less than 72 hours) and delayed (more than 72 hours up to 6 weeks) laparoscopic cholecystectomy. The patients were followed for three months after the surgery. The primary outcome measures were conversion to open surgery and postoperative complications whereas secondary outcome measures were hospital stay and return to full activity. Comparison of quantitative variables and qualitative variables was done using unpaired student's "t" test and chi-square test/ Fisher's exact test respectively.

Results: Conversion to open cholecystectomy ($p = 0.007$) and post-operative complications ($p = 0.032$) were significantly less in early laparoscopic cholecystectomy group compared to delayed laparoscopic cholecystectomy group. Mean days of hospital stay (4.9 versus 7.4 with $p = 0.001$) and mean days of return to full activities (12.6 vs 16.3 days with $p = 0.001$) was significantly less in early laparoscopic surgery group compared to delayed laparoscopic cholecystectomy group. Mean duration of surgery was significantly less in early laparoscopic surgery group as compared to delayed laparoscopic surgery group (69.3 versus 108.5 minutes, with $p = 0.001$).

Conclusions: Early laparoscopic cholecystectomy is better choice than delayed laparoscopic cholecystectomy in acute cholecystitis.

Keywords: Acute cholecystitis, laparoscopic cholecystectomy, early surgery, delayed surgery, gallstones, surgical outcomes.

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INTRODUCTION

Acute cholecystitis is an inflammatory condition of the gallbladder, usually caused by obstruction of the cystic duct by gallstones. It accounts for a significant proportion of emergency surgical admissions worldwide. Clinical manifestations include right upper quadrant pain, fever, nausea, vomiting, and leukocytosis. If left untreated, acute cholecystitis may progress to gangrene, perforation, empyema, or generalized peritonitis. Laparoscopic cholecystectomy has become the standard surgical treatment due to its minimally invasive nature, reduced postoperative pain, shorter recovery time, and improved cosmetic outcomes. Despite its widespread acceptance, debate has historically existed regarding the ideal timing

of surgery. Early laparoscopic cholecystectomy is generally performed during the initial hospital admission, whereas delayed surgery follows conservative treatment with antibiotics and supportive care until inflammation subsides. Recent clinical guidelines increasingly favor early intervention due to accumulating evidence demonstrating improved patient outcomes. A variety of treatments have been offered from time to time for gall bladder (GB) diseases. Cholecystectomy has stayed as one of the best and most accepted treatment modalities for GB diseases. Every year, about 500,000 people all over the world have their gall bladders removed. Acute cholecystitis was traditionally treated with antibiotics and supportive treatment and cholecystectomy was performed after 6 weeks of the acute episode.¹⁻⁴ The potential hazard of severe complications, if surgery is performed in an area of distorted anatomy caused by acute inflammation was the major concern.⁵ Till date laparoscopic cholecystectomy is considered the 'gold standard' in the treatment of cholelithiasis/cholecystitis and highlights all the advantages of laparoscopy as minimally invasive surgical aid.⁶ Initially laparoscopic cholecystectomy used to be done in selected cases, but with advances in instrumentation, better visualisation because of new generation cameras and optics, increasing knowledge about the anatomy of the hepato-biliary tree and the surrounding structures and improved surgical skills, surgeons started performing laparoscopic cholecystectomy even in acute cholecystitis, which was initially considered a relative contraindication. It is now the procedure of choice for patient presenting with acute cholecystitis unless it is contraindicated for technical reason or safety. The present study was undertaken to compare the outcome and postoperative complications of early vs delayed laparoscopic cholecystectomy in acute cholecystitis.

METHODS

Fifty patients aged more than 21 years of age having acute cholecystitis with clinical and sonographic evidence admitted in Sudha Medical College & Hospital, Kota, Rajasthan between January 2024 to December 2025 for laparoscopic cholecystectomy and ready to participate in this study were included after explaining potential advantages, and risk. Permission was obtained from ethics committee and scientific advisory committee of the institution. Patients with coagulopathy, severe chronic obstructive pulmonary disease, end stage liver disease, congestive cardiac failure, obstructive jaundice and pregnant women were excluded from this prospective, observational study.

In the present study, following criteria were used to define acute cholecystitis

- Clinical: Right upper quadrant pain with tenderness (Murphy's sign) and fever
- Sonological: Cholelithiasis (GB Calculi, single /multiple/sludge), thickened GB wall (>3 mm), sonographic Murphy's Sign, peri-cholecystic collection

A thorough clinical history was taken with particular stress on symptoms like pain in right hypochondrium, fever, and vomiting. Physical examination was done to correlate and confirm the diagnosis and assess the patient for operation. Routine investigations in all cases included blood counts, blood sugar level, serum creatinine, liver function tests, chest X-ray, electrocardiogram, HIV and HBsAg. Routine ultrasound was done in all patients. The operative technique was explained to all the patients and his/her relatives with all the possible risks and written informed consent was obtained for research, laparoscopic surgery and if required open cholecystectomy. All patients were prepared as for routine abdominal surgery with fasting for six hours. We have used general anaesthesia (GA) in all cases. Ryle's tube was passed to deflate the stomach in cases where stomach was distended. The sub-umbilical port of 10 mm was made after creating pneumoperitoneum with the help of Veress needle. A trocar was inserted using a rotator movement and the entry in the peritoneal cavity was confirmed. The pressure of the CO₂ in the abdomen was allowed to rise up to 14 mm of Hg. The telescope was inserted, camera was connected to it and the initial diagnostic laparoscopy was carried out visualizing the gall bladder. Second port was placed in the epigastrium. This port was a 10 mm cannula inserted under direct vision just below the xiphi-sternum. Third port of 5 mm was inserted through a right sub-costal incision. The gall bladder was visualized, and port placed near it, slightly lateral to the fundus of gall bladder. Fourth port, another 5 mm cannula was placed laterally in anterior axillary line under direct vision. This port was directed towards the fundus of the gall bladder. The Calot's triangle was identified by holding gall bladder fundus by a grasper. Adhesions if any were separated or divided after cauterization. The fundus of the gall bladder was pushed up and to the right over the liver using grasping forceps. Further retraction was done by the second grasper holding the gall bladder neck exposing the Calot's triangle. Cystic duct was dissected, the duct was well skeletonized. Two clips were applied on the cystic duct, one towards the common bile duct and one towards the gall bladder. The cystic duct was divided. Cystic artery was defined, dissected, doubly clipped and divided. Gall bladder was lifted from its bed and dissected by diathermy hook. Haemostasis was secured. Gall bladder was extracted through the epi-gastric port. We kept a No. 14 or 16 Ryle's tube as a drain in gall bladder fossa in some patient's (gangrenous GB, emphysematous or perforated GB). This was placed through fourth port. Closure of the 10 mm ports was done with 1-0/2-0 vicryl. Skin closure was done with 2-0/3-0 ethilon.

After one hour in the recovery room, the patient was shifted to the ward. Pain relief was obtained by diclofenac or paracetamol injection. Parenteral antibiotics were continued for 48-72 hours. The Ryle's tube was removed after 12 hours and oral clear liquids commenced on the evening of surgery if there is no nausea or vomiting. The drainage tube (if placed) was removed after 24 hours if there is no significant drain. Patients were discharged on 3rd - 4th postoperative day in most of the cases. The patients were evaluated daily during their stay in the hospital. On discharge, they were requested to attend outpatient department on day seven, one month and three months. At each assessment, the patients were evaluated in detail and the data was collected in individual proforma. At the end of the study the entire data was collected and analysed. We

defined operation of cholecystectomy within 72 h of presentation as ‘early’ laparoscopic cholecystectomy and anywhere thereafter up to 6 weeks as ‘delayed’ laparoscopic cholecystectomy.

Data collected were entered in the Excel 2007 and analysis of data was done using Statistical Package for Social Sciences (SPSS) version 20, IBM, USA. The comparison of quantitative variables between the groups such as mean age, mean duration of surgery, mean hospital stay, and mean days to return to full activity was done using unpaired student’s “t” test, whereas comparison of qualitative variables such as gender, complications of surgery and conversion to open surgery was done by using chi-square test or Fisher’s exact test. The confidence limit for significance was fixed at 95% level with p-value < 0.05.

RESULTS

Laparoscopic cholecystectomy was performed on 50 patients confirmed as acute cholecystitis between January 2024 to December 2025. The mean age of patients was 42 years. In all 64% of patients were female and 36% were male. They were followed up on day seven, one month and three months.

Table 1: Characteristics of patients at baseline.

Characteristics	Early laparoscopic cholecystectomy (N= 30)	Delayed laparoscopic cholecystectomy (N = 20)	p-value
Mean age in years (SD)	44.2 (±11.4)	39.5 (±11.7)	0.165
Gender (%)			
Males	20 (66.7)	12 (60.0)	0.765
Females	10 (33.3)	8 (40.0)	

Table 2: Clinical outcome.

Characteristics	Early laparoscopic cholecystectomy (N = 30)	Delayed laparoscopic cholecystectomy (N = 20)	p-value
Duration of surgery in minutes (SD)	69.3 (±15.3)	108.5 (±16.9)	0.001
Complications (%)			
Yes	1 (3.3)	5 (25.0)	0.032
No	29 (96.7)	15 (75.0)	
Conversion to open surgery			
Yes	0 (00.0)	5 (25.0)	0.007
No	30 (100.0)	15 (75.0)	
Mean hospital stay in days (SD)	4.9 (±2.1)	7.4 (±1.8)	0.001
Mean days to return full activity (SD)	12.6 (±3.3)	16.3 (±2.4)	0.001

Table 3: Mean total hospital stay.

Name of the author	Mean total hospital stay (in days)		
	Early laparoscopic cholecystectomy	Delayed laparoscopic cholecystectomy	Significance
Garber SM et al13	5.5	10.8	S
Lai PB et al5	7.6	11.6	S
Lo CM et al14	6	11	S
Johansson M et al15	5	8	S
Madan AK et al16	2.1	5.4	S
Jarrar MS et al7	1.84	3.34	S
Chang TC et al9	4.53	7.79	S
Present study	4.9	7.4	S

As depicted in Table 1, there was no statistically significant difference between mean age and gender in both the groups. As shown in Table 2, there was a statistically significant difference in duration of surgery, conversion to open surgery, post-operative complications, mean duration of hospital stay and mean days to return to the full activities in both the groups. Delayed laparoscopic cholecystectomy group had longer duration of surgery, more conversion to open surgery, higher percentage of post-operative complications, longer duration of hospital stay and longer duration of return to full activities as compared to early laparoscopic cholecystectomy group.

Out of 50 laparoscopic cholecystectomies, six cases (12%) had complications. Two patients had minor bile leak managed endoscopically, two patients had wound infection managed with antibiotics and dressing, one patient had sub-hepatic

collection managed conservatively, one patient had bowel herniation at port site diagnosed on X-ray abdomen as obstruction and on ultrasonography as bowel herniation through the port site. This patient was explored locally through laparotomy under GA on the next day. Bowel was inflamed but viable. Patient improved and was discharged on 10th day without any complaint. Majority of these complications were found in delayed cases. Five out of 50 cases of laparoscopic cholecystectomy needed to be converted to open cholecystectomy. Conversion to open cholecystectomy of all these five patients was done while performing delayed laparoscopic cholecystectomy i.e. after 72 hours of presentation. Conversion to open cholecystectomy occurred in three cases due to dense adhesion and in two cases due to bleeding.

DISCUSSION

The present research was conducted to compare the outcome and postoperative complications of early vs delayed laparoscopic cholecystectomy in acute cholecystitis in 50 patients.

In the present study duration of surgery was 108.5 (± 16.9) minutes in delayed laparoscopic cholecystectomy group as compared to 69.3 (± 15.3) minutes early laparoscopic cholecystectomy group which was statistically significant. Jarrar MS et al reported that duration of surgery was significantly longer for delayed laparoscopic cholecystectomy group as compared to early laparoscopic cholecystectomy group (97 minutes versus 82.17 minutes, $p = 0.003$).⁷ The finding is similar to the present study. Uysal E et al reported that there was no statistically significant difference in the duration of operation among the groups whereas Chang TC et al reported that patients undergoing early laparoscopic cholecystectomy had significantly longer operation time as compared to delayed laparoscopic cholecystectomy group (109 $\pm$ 37.59 minutes versus 77 $\pm$ 25.65 minutes, $p < 0.001$).^{8,9} In the present study there was 5/25 (20%) conversion to open cholecystectomy in delayed laparoscopic cholecystectomy group whereas there was no conversion in early laparoscopic cholecystectomy group. The finding of the present study substantiated the results of Jarrar MS et al (20% in delayed group versus 11.6% in early group) Various studies reported that there was no statistically significant difference in conversion rates among the groups.⁸⁻¹¹ Contrary to above studies, Minutolo V et al reported that conversion rate was higher in early laparoscopic cholecystectomy group.¹²

In the present study post-operative stay was 7.4 (± 1.8) days in delayed laparoscopic cholecystectomy group whereas it was 4.9 (± 2.1) days in early laparoscopic cholecystectomy group which was statistically significant. Similar results were reported by various studies.⁷⁻¹² Various studies depicted in table 3 show that mean days of hospital stay for early laparoscopic cholecystectomy was significantly less as compared to delayed laparoscopic cholecystectomy. Present study substantiates the findings of these studies. There was increased post-operative stay because of the complications most of which were managed conservatively. In the present study the mean time required for return to normal activities or normal work was 12.5 days for early laparoscopic cholecystectomy group whereas it was 16.3 days in delayed laparoscopic cholecystectomy which was statistically significant. Lo CM et al reported mean time required for return to normal activities 12 and 19 days for early laparoscopic cholecystectomy group and delayed laparoscopic cholecystectomy group which was statistically significant.¹⁴ The results are respectively similar to our study. Limitation of the study was that it was conducted on small number of patient population of fifty and patients could not be randomized.

CONCLUSION

Early laparoscopic cholecystectomy has emerged as the preferred treatment for most patients with acute cholecystitis. Although early surgery may occasionally present greater technical difficulty due to acute inflammation, numerous clinical studies have demonstrated that it is safe, effective, and associated with shorter hospital stay, reduced healthcare costs, fewer recurrent biliary events, and improved patient quality of life. Delayed surgery remains appropriate for carefully selected patients who are unsuitable for immediate operative intervention. The duration of surgery, post-operative complications, conversion to open cholecystectomy, mean days of hospital stay and mean days of return to full activities was less in early laparoscopic surgery group as compared to delayed laparoscopic surgery group in acute cholecystitis.

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