

# Comparison of Early and Delayed Laparoscopic Cholecystectomy in Acute Cholecystitis

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## ABSTRACT

**Background:** Laparoscopic Cholecystectomy is now accepted as being safe for acute cholecystitis. However, it has not become routine, because the exact timing and approach to the surgical management remains ill define. Careful selection of patients, the knowledge of typical procedure-related complications, and their best treatment are the key points for a safe Laparoscopic Cholecystectomy. **Objective:** To compare the early and delayed Laparoscopic Cholecystectomy in the acute phase in terms of frequency of conversion to open cholecystectomy. **Study Design:** Randomized clinical trial. **Settings:** Department of Surgery, Divisional Headquarter Hospital, Faisalabad. Punjab Medical College, Faisalabad Pakistan. **Duration:** Study was carried out over a period of six months from June 2018 to May 2019. **Methodology:** A total of 152 cases (76 cases in each group) were included in this study. All patients were randomly allocated to either group i.e., group -A early Laparoscopic Cholecystectomy and group-B delayed Laparoscopic Cholecystectomy. **Results:** Mean age was  $39.09 \pm 8.8$  and  $37.05 \pm 8.5$  years in group- A and B, respectively. In group-A, male patients were 48 (63.2%) and female patients were 28 (36.8%). Similarly, in group-B, male patients were 41 (53.9%) and female patients were 35 (46.1%). Conversion to open cholecystectomy was required in 6 patients (7.9%) of group-A and 16 patients (21.0%) of group - B. Significant difference between two groups was observed ( $P= 0.021$ ). **Conclusion:** Early laparoscopic cholecystectomy for acute cholecystitis is safe and feasible in terms of less frequency of conversion to open cholecystectomy.

**Keywords:** Delayed laparoscopic cholecystectomy, Early laparoscopic cholecystectomy, Acute cholecystitis.

## INTRODUCTION

Acute cholecystitis is acute inflammation of gallbladder manifesting as severe abdominal pain (epigastrium/right hypochondrium), fever and leukocytosis ( $10 \times 10^9/L$ ). acute cholecystitis is secondary to gallstones in 90 to 95% of cases. Acute acalculous cholecystitis is a condition that typically occurs in patients with other acute systemic disease. In less than 1% of acute cholecystitis, the cause is a tumor obstructing the cystic duct. Obstruction of the cystic duct by a gallstone is the initiating event that leads to gallbladder distention, inflammation, and edema of the gallbladder wall.

Gallstone is the most common cause of cholecystitis. Patient present with recurrent attacks of epigastric or right hypochondrial pain, nausea, vomiting, indigestion, dyspepsia, flatulence, intolerance to fatty food, abdominal distention and belching.<sup>1</sup>

Cholecystectomy for the management of gallstone disease is feasible and achievable by open and laparoscopic route.<sup>2,3</sup> Surgery for gallstones may be associated with post-operative complications, like pain, nausea, vomiting and / or wound infection.<sup>4</sup> The aim of both techniques is to remove the gallbladder safely with low mortality, morbidity and early recovery.

For patients of acute cholecystitis, cholecystectomy is the treatment of choice in the absence of medical contraindications. However, the timing of surgery in acute cholecystitis remains controversial; many authors favor early intervention whereas others suggest that delayed approach is preferable. Laparoscopic cholecystectomy is nor firmly established as the gold standard therapy for asymptomatic gallstones. Those favoring the delayed approach argue that intervention in acute phase has difficulty in dissection and identification

of anatomical structures due to oedema, higher incidence of conversion to open cholecystectomy and higher incidence of common bile duct injury, and as more than 70% of patients respond to conservative management, therefore, interval cholecystectomy can be performed after 6 weeks. Alternatively, the operation can be performed as a planned procedure during the first 48-72 hours of inflammation, when the associated oedema makes the tissue planes easier to dissect. Early intervention also rules out complications of gallstones; recurrent attacks of biliary colic/acute cholecystitis, acute pancreatitis, empyema gall-bladder, perforation of gall-bladder, which may be found in patients managed conservatively and in whom interval cholecystectomy is planned.

Concerns that cholecystectomy, particularly laparoscopic is more hazardous in the acute phase appear unfounded and for both medical and economic reasons. Cholecystectomy within acute phase is now generally advocated. A study showed that there was no significant differences in the rate of conversion to open cholecystectomy in both groups (6.4 % vs 20%).

A few studies have been conducted that showed that early laparoscopic cholecystectomy can be performed in acute phase with no added complications as compared to delayed, rather early intervention decreases patient's morbidity, hospital stay and cost of treatment.<sup>2-7</sup>

Our institution is a tertiary care unit attached with Punjab Medical College, Faisalabad, where we perform laparoscopic procedures as a routine. The study is important because of it is proven that early laparoscopic cholecystectomy has not higher conversion rate than delayed laparoscopic cholecystectomy, it can help to change the conventional delayed surgical approach which will decrease patients morbidity by decreasing complications of gallstones and will also decrease extra burden on hospital by decreased hospital stay and eliminating readmissions with complications of gallstones. Though literature is available on the said objective but a local study at regional level is required before early laparoscopic cholecystectomy can be implemented in such cases.

The objective was to compare the early and delayed laparoscopic cholecystectomy in the acute phase in terms of frequency of conversion to open cholecystectomy.

### OPERATIONAL DEFINITIONS

**Acute cholecystitis** having characteristics of pain right hypochondrium, continuous in character lasting more than 6 hours, confirmed by raised TLC (>10000) and positive ultrasonographic findings (edematous gall bladder, fluid around gallbladder).

**Early laparoscopic cholecystectomy** is removal of gallbladder laparoscopically within 72 hours of onset of inflammation.

**Delayed laparoscopic cholecystectomy** is cholecystectomy after 6 weeks of conservative management of acute cholecystitis.

**Conversion to open cholecystectomy** was carried out per-operatively in conditions like severe bleeding (which may obscure the anatomy or disturb the vitals of the patients), adhesions difficult to separate laparoscopically and anatomy is not clear, injury bile duct and others.

**Hypothesis:** The frequency of conversion to open cholecystectomy is less with early as compared to delayed cholecystectomy.

### METHODOLOGY

**Study Design:** Randomized clinical trial.

**Settings:** Department of Surgery, Divisional Headquarter Hospital, Faisalabad, Punjab Medical College.

**Duration:** 01 year from June 2018 to May 2019.

**Sample Technique:** Non-probability consecutive.

**Sample Size:** By using WHO sample size calculator for two proportions:

P1 = 6.4% (1), P2 = 20, Power of study = 80%, Level of significance = 10%, Sample size = 152 (76 in each group)

**Inclusion Criteria:** Patients with established diagnosis of acute cholecystitis, confirmed by clinical findings. TLC > 10,000 per cu. Mm (2cc blood taken from vein), ultrasonographic findings suggestive of acute cholecystitis, Within 5 days of admission in hospital with acute cholecystitis and patients 20-50 years of age.

**Exclusion Criteria:** Patients with decompensated cirrhosis of liver, patients with unacceptable anesthetic risks, patients with acute cholangitis, pancreatitis or gallbladder malignancy excluded from study and patients having stones in common bile duct on ultrasonography or having obstructive jaundice.

**Data Collection Procedure:** After obtaining permission from the hospital ethical committee, all-inclusive patients of the study admitted through outpatient department and emergency. Regarding ethical issues, patients were explained about the diagnosis, different options of treatment, its benefits and drawbacks and written informed consent was obtained. Conversion to open cholecystectomy was done in cases with severe bleeding (more than 200ml), adhesions difficult to negotiate laparoscopically, injury to CBD and others. All patients would be operated under general anesthesia by the same team of surgeon's expert in laparoscopic surgery. All patients were randomly allocated to either group i.e., group-A early laparoscopic cholecystectomy group - delayed laparoscopic cholecystectomy. All patients would receive a single dose of prophylactic I/V antibiotic at the time of anesthesia. Operative fields would be cleaned in all patients of group-A and group-B. All patients are aggressively mobilized to ambulate on the day of surgery or the 1<sup>st</sup> postoperative day conversion to open cholecystectomy was opted in patients with above mentioned indications, with right subcostal incision

(Kocher;s) routine follow-up evaluation was performed by principal investigator.

**Data Analysis:** Data obtained was entered and analyzed in SPSS version 20. Qualitative variables like gender. Conversion to open cholecystectomy was calculated as frequency and percentage. The Chi-Square test was used to compare the difference in conversion to open cholecystectomy in both groups. Quantitative variables like age was presented as mean  $\pm$  SD. P value < 0.05 was considered significant.

## RESULTS

A total of 152 patients (76 in each group) were studied during the study. Regarding age distribution, in group-A, 14 patients (18.4%) and in group-B, 17 (22.4%) were between 20-30 years of age. 20 patients (26.3%) in group - A and 32 patients (42.1%) in group-B were between 31-40 years old. 42 patients (55.3%) from group - A and 27 patients (35.5% from group - B were between 41-50 years of age. Mean age was 39.09  $\pm$  8.8 and 37.05  $\pm$  8.5 years in group- A and B, respectively (Table 1)

**Table 1: Distribution of cases by age (N= 152)**

Age (Year)	Group-A Early Laparoscopic Cholecystectomy		Group-B delayed laparoscopic cholecystectomy	
	Number	%	Number	%
20-30	14	18.4	17	22.4
31-40	20	26.3	32	42.1
41-50	42	55.3	27	35.5
<b>Total</b>	<b>76</b>	<b>100.0</b>	<b>76</b>	<b>100.0</b>
<b>Mean <math>\pm</math> SD</b>	<b>39.09 <math>\pm</math> 8.8</b>		<b>37.05 <math>\pm</math> 8.5</b>	

In group - A male patients were 48 (63.2%) and female patients were 28 (36.8%). Similarly, in group - B, male patients were 41 (53.9%) and female patients were 35 (46.1%). Table 2

**Table 2: Distribution of cases by Gender (N=152)**

Gender	Group-A Early Laparoscopic Cholecystectomy		Group-B delayed Laparoscopic Cholecystectomy	
	Number	%	Number	%
<b>Male</b>	<b>48</b>	<b>63.2</b>	<b>41</b>	<b>53.98</b>
<b>Female</b>	<b>28</b>	<b>36.8</b>	<b>35</b>	<b>46.1</b>
<b>Total</b>	<b>76</b>	<b>100.0</b>	<b>76</b>	<b>100.0</b>

Conversion to open cholecystectomy was required in 6 patients (7.9%) of group - A and 16 patients (21.0%) of group - B. Significant difference between two groups was observed (P=0.021) (Table 3).

Table 4 reveals the causes of conversion to open cholecystectomy.

**Table 3: Distribution of cases by conversion to open cholecystectomy (N=152)**

Conversion to open cholecystectomy	Group-A Early Laparoscopic Cholecystectomy		Group-B delayed laparoscopic cholecystectomy	
	Number	%	Number	%
<b>Yes</b>	<b>06</b>	<b>07.9</b>	<b>16</b>	<b>21.0</b>
<b>No</b>	<b>70</b>	<b>92.1</b>	<b>60</b>	<b>79.0</b>
<b>Total</b>	<b>76</b>	<b>100.0</b>	<b>76</b>	<b>100.0</b>

Chi Square = 5.31, Df = 1, P-Value = 0.021

**Table 4: Distribution of cases by causes (N=152)**

Causes	Group-A Early Laparoscopic Cholecystectomy n=76		Group-B delayed laparoscopic cholecystectomy n=76	
	Number	%	Number	%
<b>Sever bleeding</b>	<b>1</b>	<b>16.7</b>	<b>5</b>	<b>31.3</b>
<b>Adhesions</b>	<b>2</b>	<b>33.3</b>	<b>8</b>	<b>18.7</b>
<b>Injury to common bile duct</b>	<b>3</b>	<b>50.0</b>	<b>8</b>	<b>50.0</b>
<b>Total</b>	<b>6</b>	<b>100.0</b>	<b>16</b>	<b>100.0</b>

## DISCUSSION

Laparoscopic cholecystectomy is the gold standard for the treatment of patients with symptomatic gallstones. However, the role of Laparoscopic cholecystectomy in acute cholecystitis is not yet established. In the developmental stages of Laparoscopic cholecystectomy, acute cholecystitis was considered a contraindication for the procedure. With increasing experience in laparoscopic surgery, a previous study have reported on the use of Laparoscopic cholecystectomy for acute cholecystitis,<sup>5,6</sup> suggesting that it is technically feasible and safe. However, the conversion rate is high. Several randomized studies in the pre-laparoscopic era had shown that early open cholecystectomy for acute cholecystitis was better than delayed open cholecystectomy in terms of shorter hospital stay, but both had similar operative mortality and morbidity,<sup>8,9</sup> early surgery for acute cholecystitis had since gained popularity in the late 1980s.

Successful Laparoscopic cholecystectomy during the period of acute inflammation is associated with an early recovery and shorter hospital stay. However, these advantages of Laparoscopic cholecystectomy can be offset by the potential hazards of serious complication<sup>6</sup> and a high conversion rate.

Theoretically, initial conservative treatment with antibiotics followed by interval elective cholecystectomy 6 to 8 weeks later, after acute inflammation has subsided, may result in a safer operation with less conversion rates. The choice between the two methods of treatment is difficult because the data prospectively comparing them are sparse. Only two prospective randomized trials<sup>1,2</sup> have been reported to date. Hence, we undertook a



randomized clinical trial to compare the early and delayed Laparoscopic cholecystectomy in the acute phase in terms of frequency of conversion to open cholecystectomy. Conversion to open cholecystectomy was 7.9% and 21.0% in early Laparoscopic cholecystectomy and delayed Laparoscopic cholecystectomy, respectively. Our results are close to the findings of Jarrar MS *et al.*<sup>1</sup> The most common reason for conversion to open cholecystectomy in both groups was injury to common bile duct in 50% of patients.

The general belief that initial conservative treatment increases the chance of successful Laparoscopic cholecystectomy at a later date probably is not true, as borne out by this study. The technical difficulty of Laparoscopic cholecystectomy is related to operative findings during early surgery. A distended, edematous gallbladder containing infected bile commonly is seen in cases of acute cholecystitis. Several technical key points must be kept in mind when laparoscopic surgery is performed for acute cholecystitis. For good exposure of Calot's triangle, decompression of the gallbladder should be done early because this allows better grasping and retraction of the gallbladder. The other technical rules call for the use of a suction-irrigation device for dissection, liberal use of a fifth port, and the use of a retrieval bag to remove spilled stones and perforated gallbladder.<sup>5</sup>

The inflammation associated with acute cholecystitis creates an edematous plane around the gallbladder, thus facilitating its dissection from the surrounding structures. Waiting for the inflamed gallbladder to cool down allows maturation of the surrounding inflammation and results in organization of the adhesions, leading to scarring and contraction, which make the dissection more difficult. Also, although inflammation in early stages may not necessarily involve Calot's triangle, chronic inflammation often scars and distorts Calot's triangle, making dissection in this critical area more difficult.<sup>7</sup>

The appropriate timing for Laparoscopic cholecystectomy in the treatment of acute cholecystitis remains controversial. More recent evaluation indicates early laparoscopic surgery may be safe option in acute cholecystitis, although conversion rates may be higher. No conclusive evidence establishing best practice in terms of clinical benefits exists.<sup>3</sup>

Early versus delayed Laparoscopic cholecystectomy for acute cholecystitis: a meta-analysis of randomized clinical trials.<sup>6</sup> Conversion to an open procedure should not be considered a complication, and the possibility should be discussed with the patient preoperatively. In most series, conversion rates are higher with emergency operations. Reported rates range from 1.5-15%, with most reporting rates around 5% in elective cases.<sup>4</sup> Analysis identified male gender, elevated white blood cell count, low serum albumin, ultrasound finding of pericholecystic fluid, diabetes, mellitus, and elevated total bilirubin as

independent predictors of conversion. Another multivariate analysis identified male sex, positive Murphy sign, gallbladder wall thickness >4mm, and previous upper abdominal surgery as independent predictors of conversion rate to laparotomy.<sup>6</sup>

## CONCLUSION

Early Laparoscopic cholecystectomy for acute cholecystitis is safe and feasible in terms of less frequency of conversion to open cholecystectomy.

## LIMITATIONS

We operate in a tertiary care hospital, it is quite common to see more severe cases at our institute which may need to be managed by open cholecystectomy rather than laparoscopy cholecystectomy.

## SUGGESTIONS / RECOMMENDATIONS

Early Laparoscopic cholecystectomy offers the additional benefit of a shorter hospital stay. It should be offered to patients with acute cholecystitis, provided the surgery is performed within 2 to 96 hours of the onset of symptoms.

## CONFLICT OF INTEREST / DISCLOSURE

No conflict of interest.

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## REFERENCES

1. Jarrar MS, Chouchène I, Fadhl H, Ghrissi R, Elghali A, Ferhi F, et al. Early versus delayed laparoscopic cholecystectomy for lithiasic acute cholecystitis during emergency admissions. results of a monocentric experience and review of the literature. *Tunis Med.* 2016;94(8-9):519-24.
2. Uysal E, Turel KS, Sipahi M, Isik O, Yilmaz N, Yilmaz FA. Comparison of Early and Interval Laparoscopic Cholecystectomy for Treatment of Acute Cholecystitis. Which is Better? A Multicentered Study. *Surg Laparosc Endosc Percutan Tech.* 2016;26(6):117-21.
3. Van der Linden W, Edlund G. Early versus delayed cholecystectomy: the effect of a change in management. *Br J Surg.* 1981;68(11):753-7.
4. Yamashita Y, Takada T, Kawarada Y, Nimura Y, Hirota M, Miura F, et al. Surgical treatment of patients with acute cholecystitis: Tokyo Guidelines. *J Hepatobiliary Pancreat Surg.* 2007;14(1):91-7.
5. Pasquali S, Boal M, Griffiths EA, Alderson D, Vohra RS; CholeS Study Group; West Midlands Research Collaborative. Meta-analysis of perioperative antibiotics in patients undergoing laparoscopic cholecystectomy. *Br J Surg.* 2016;103(1):27-34.
6. Lamberts MP, Den Ouden BL, Gerritsen JJ, Roukema JA, Westert GP, Drenth JP, et al. Prospective multicentre cohort study of patient-reported outcomes after cholecystectomy for uncomplicated symptomatic cholelithiasis. *Br J Surg.* 2015;102(11):1402-9.
7. van Dijk AH, Wennmacker SZ, de Reuver PR, Latenstein CSS, Buyne O, Donkervoort SC, et al. Restrictive strategy versus usual care for cholecystectomy in patients with gallstones and abdominal pain (SECURE): a multicentre, randomised, parallel-arm, non-inferiority trial. *Lancet.* 2019;393(10188):2322-30.