

## Original Research

**Comparative Study between Early and Late Laparoscopic Cholecystectomy in the Treatment of Acute Cholecystitis: A cohort prospective study**Dr. Brajesh Kumar<sup>1</sup>, Dr. Brajkishor Kumar<sup>2</sup>, Dr. Khursheed Alam<sup>3</sup><sup>1,2</sup>Senior Resident, Department of surgery, Government Medical College and Hospital, Bettiah, West Champaran, Bihar, India.<sup>3</sup>Assistant Professor, Head of Department, Department of surgery, Government Medical College and Hospital, Bettiah, West Champaran, Bihar, India.**Corresponding author:** Dr. Brajkishor Kumar

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Received: 29 October, 2023

Accepted: 29 November, 2023

**Abstract**

**Background:** Laparoscopic cholecystectomy (LC) is the gold standard treatment of choice in the management of calculus gallbladder disease in the general population. The advantages of laparoscopic cholecystectomy over open surgery include less postoperative pain, early mobilisation, less pulmonary function impairment, decreased operative stress, and a shorter hospital stay.

**Aims and Objectives of the Study:** For acute cholecystitis, we compared the clinical outcomes and costs of early versus delayed laparoscopic cholecystectomy.

**Materials and Methods:** The present prospective cohort study consists of 80 patients with a clinical diagnosis of acute cholecystitis admitted to the surgical wards either through OPD or emergency in the general surgery department.

**Results:** The mean age of patients in early laparoscopic cholecystectomy was 32.47 years, whereas in late laparoscopic cholecystectomy it was 41.82 years. In the present study, males were 22 and females were 58, respectively. The mean duration of hospital stay was 3.50 days in early LC and 5.73 days in late LC. The mean duration of surgery was 40.71 minutes in early LC and 52.73 minutes in late LC.

**Conclusions:** Early cholecystectomy is feasible and safe for acute cholecystitis and is a better method of treatment because of its shorter hospital stay, which is a major economic benefit to both the patient and the health care system. The level of difficulty in technique, peri-operative and post-operative complications, and hospital stay are higher in delayed laparoscopic cholecystectomy.

**Key words:** acute cholecystitis, laparoscopic cholecystectomy, outcome assessment, and cost analysis.

**Introduction**

The prevalence of cholesterol gallstones has increased exponentially, especially in obese people in both developing and developed countries. The expanded predominance of stones is generally due to the supersaturation of bile with cholesterol due to increased synthesis by the liver and emission into bile. Saturation is additionally increased during weight reduction [1,2]. Laparoscopic cholecystectomy (LC) is the gold standard treatment of choice in the management of calculus gallbladder disease in the general population. The advantages of laparoscopic cholecystectomy over open surgery include less postoperative pain, early mobilisation; less pulmonary function impairment, decreased operative stress, and a shorter hospital stay [3]. Acute cholecystitis is usually managed conservatively, which includes the administration of intravenous antibiotics and analgesics to reduce potential consequences from inflammation, followed by an elective laparoscopic cholecystectomy after 4-6 weeks. The refreshed Tokyo Guidelines propose that an early laparoscopic cholecystectomy (ELC) is compulsory for patients with mild cholecystitis, whereas delayed laparoscopic cholecystectomy (DLC) can be performed in patients with moderate or severe cholecystitis[4]. Early cholecystectomy has the advantage of quick definitive treatment of the disease on the first hospital admission itself and avoids the problems of failed conservative management and recurrent symptoms [5]. Despite these recommendations, laparoscopic cholecystectomy for acute cholecystitis is not being performed regularly because the timing and approach to the surgical management of patients with acute cholecystitis are still a matter of controversy. The ideal timing of cholecystectomy in patients with acute cholecystitis still remains a matter of debate.

**Aims and objectives of study:** The study was conducted to compare the effects of early and late laparoscopic cholecystectomy in the management of acute cholecystitis.

### Materials and Methods

The present prospective cohort study consists of 80 patients with a clinical diagnosis of acute cholecystitis admitted to the surgical wards either through OPD or emergency in the general surgery department of Government Medical College and Hospital, Bettiah, West Champaran, Bihar, India.

All patients were informed regarding the study, and their written consent was obtained. The institutional ethical committee granted ethical approval. The during study was between August 2022 to July 2023, who underwent laparoscopic cholecystectomy on an elective basis. The following criteria were used to define acute cholecystitis in the present study:

1. Clinical: Right upper quadrant pain with tenderness (Murphy's sign)
2. Sonological: Cholelithiasis (GB Calculi, single or multiple sludge), thickened GB wall (>3 mm), sonographic Murphy's sign, peri-cholecystic

### Inclusion criteria:

1. Age group >20–70 years
2. Symptomatic gallstone disease (SGB) Biliary colic pain
3. Acute cholecystitis

### Exclusion criteria

1. Age <20 or >70 years
2. Not willing to participate
3. Severe concomitant disease
4. Suspected common bile duct stone, gall stone-induced pancreatitis, suspected concomitant acute cholangitis,
5. Severe pre-existing medical co-morbidity
6. Contraindications for laparoscopic cholecystectomy
7. Pregnancy
8. Previous upper abdominal surgery
9. Asymptomatic gallstone disease

The participants were divided into two groups containing 40 patients each: Group A (early laparoscopic cholecystectomy) and Group B (delayed laparoscopic cholecystectomy). The hospital records of these patients were reviewed, and a detailed analysis of the clinical notes was made. The collection of data was done by using a structured predesigned proforma containing a checklist including variables like patients' demographic profile, relevant history (history of jaundice, frequency of attacks of cholecystitis, pancreatitis, diabetes, and alcoholic liver disease), clinical findings, biochemical and radiological investigations, operative time, intraoperative details, post-operative complications, and duration of total hospital stay. All patients who were operated upon by consultants and underwent standard four-port laparoscopic cholecystectomy were included in the study. A detailed evaluation and documentation of the management plan, the postoperative progress of the patients, and complications during the stay in the hospital were made.

**Statistical Analysis:** Data collected was entered in Microsoft Excel 2016, and data analysis was done using Statistical Package for Social Sciences (SPSS) version 22, 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 the unpaired student's "t" test, whereas the comparison of qualitative variables, such as gender, complications of surgery, and conversion to open surgery, was done using the chi-square test or Fisher's exact test. The confidence limit for significance was fixed at 95% level with a p-value < 0.05.

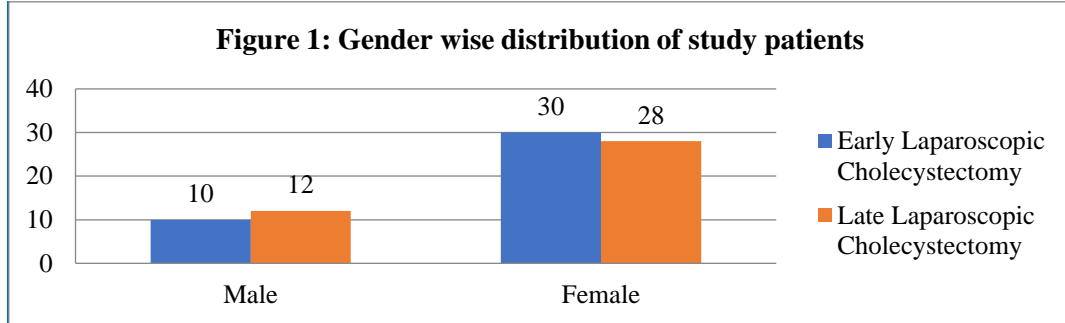
### Results

The mean age of patients was 32.47 years in early laparoscopic cholecystectomy where as in late laparoscopic cholecystectomy was 41.82 years. In present study, male was 22 and female was 58 respectively. Mean duration of Hospital stay was 3.50 days in early LC and 5.73 days in late LC. Mean duration of surgery was 40.71 minutes in early LC and 52.73 minutes in late LC (Table 1).

| <b>Table 1: Demographic characteristics of studied patients undergoing Laparoscopic Cholecystectomy</b> |   |  |         |
|---|---|--|---------|
| Parameters  | Early Laparoscopic Cholecystectomy (n=40) | Late Laparoscopic Cholecystectomy (n=40) | P value |
| Mean Age (years)  | 32.47±6.50                                | 41.82±12.40                              | 0.004*  |
| Gender  |   |  |         |
| Male  | 10(25%)                                   | 12(30%)                                  | 0.07    |

|                                       |             |             |        |
|---------------------------------------|-------------|-------------|--------|
| Female                                | 30(75%)     | 28(70%)     |        |
| Mean duration of Hospital stay (Days) | 3.50±1.50   | 5.73±4.91   | 0.14   |
| Duration of pain (Hours)              | 1.92±0.25   | 1.86±0.40   | 0.62   |
| Mean duration of surgery (Minutes)    | 40.71±10.47 | 52.73±10.92 | 0.001* |

\*Significant value



**Table 2: basic complains of studied patients undergoing Laparoscopic Cholecystectomy**

| Complains                       | Early Laparoscopic Cholecystectomy(n=40) | Late Laparoscopic Cholecystectomy(n=40) |
|---------------------------------|--|---|
| <b>Right Hypochondrial Pain</b> |  |   |
| Present                         | 40 (100%)                                | 10(25%)                                 |
| Absent                          | 0(0%)                                    | 30(75%)                                 |
| <b>Fever</b>                    |  |   |
| Present                         | 8(20%)                                   | 4(10%)                                  |
| Absent                          | 32(80%)                                  | 36(90%)                                 |
| <b>Vomiting</b>                 |  |   |
| Present                         | 22(55%)                                  | 0(0%)                                   |
| Absent                          | 18(45%)                                  | 40(100%)                                |
| <b>Nausea</b>                   |  |   |
| Present                         | 14(35%)                                  | 8(20%)                                  |
| Absent                          | 26(65%)                                  | 32(80%)                                 |
| <b>Jaundice</b>                 |  |   |
| Present                         | 00(0%)                                   | 00(0%)                                  |

**Table-3: Showing the USG findings in the early vs. the delayed Laparoscopic Cholecystectomy**

| USG findings                                  | Early Laparoscopic Cholecystectomy(n=40) | Late Laparoscopic Cholecystectomy(n=40) |
|---|--|---|
| <b>Gall Bladder Size</b>                      |  |   |
| Distended                                     | 38(95%)                                  | 14 (35%)                                |
| Normal  | 2 (05%)                                  | 26(65%)                                 |
| <b>Gall bladder wall thickness (&gt;3 mm)</b> |  |   |
| Normal  | 0 (0%)                                   | 8 (20%)                                 |
| Thickened                                     | 40 (100%)                                | 32(80%)                                 |
| <b>Gall Bladder Stones</b>                    |  |   |
| Multiple Stones                               | 36(90%)                                  | 34(85%)                                 |
| Solitary Stone                                | 4 (10%)                                  | 06(15%)                                 |
| <b>CBD</b>                                    |  |   |
| Normal  | 40 (100%)                                | 40(100%)                                |
| Dilated                                       | 0 (0%)                                   | 0 (0%)                                  |
| <b>IHBR</b>                                   |  |   |
| Dilated                                       | 0 (0%)                                   | 0 (0%)                                  |
| Normal  | 40 (100%)                                | 40 (100%)                               |

| Conversion rate  | Early Laparoscopic | Delayed Laparoscopic | P= value |
|------------------|--------------------|----------------------|----------|
| Successful LC    | 39                 | 37                   | 0.08     |
| Conversion to OC | 1                  | 3                    |          |
| Conversion rate  | 3%                 | 6%                   |          |

| Complications                         | Early Laparoscopic (n=40) | Delayed Laparoscopic (n=40) |
|---------------------------------------|---------------------------|-----------------------------|
| <b>complications (Intraoperative)</b> |                           |                             |
| CBD Injury                            | 0 (0%)                    | 0 (0%)                      |
| Visceral Injury                       | 0 (0%)                    | 0 (0%)                      |
| <b>Adhesions</b>                      |                           |                             |
| Found                                 | 0(0%)                     | 8(20%)                      |
| Not Found                             | 0 (0%)                    | 32 (80%)                    |
| <b>Complication (Post-Operative)</b>  |                           |                             |
| Biliary Leakage                       | 0 (0%)                    | 0 (0%)                      |
| Wound Infection                       | 1(2.5%)                   | 2 (5%)                      |
| <b>Pain</b>                           |                           |                             |
| Yes                                   | 0(0%)                     | 6 (15%)                     |
| No                                    | 0 (0%)                    | 34 (85%)                    |

### Discussion

Laparoscopic cholecystectomy has become affordable, beneficial, and practicable for the majority of surgeons. It has long been a point of contention when cholecystectomy should be performed on patients with acute cholecystitis. As the experience and confidence of surgeons in laparoscopic cholecystectomy rose, several clinical trials, though the samples were small in size, proved that early laparoscopic cholecystectomy in acute cholecystitis is feasible, safe, cheaper, and requires shorter hospitalisation, thus decreasing the total cost of treatment. In the present study, the incidence of acute cholecystitis was highest between 35 and 50 years of age, with an average of 42.5 years, which is comparable with other studies. Kolla et al. [6] in a series of 40 patients reported a mean age of 40 years. In our study, out of 80 patients, 58 were female and 22 were male, and the female to male ratio was 2.64:1, which is comparable with other studies. Cameron et al. [7] in their study of 109 patients, found that 76 were females and 33 were males (F:M = 2.30:1). In the present study, the most common symptoms and clinical findings were pain in the abdomen (100%), nausea and vomiting (27.5%), and fever (15%), which is comparable with other studies. De Camp et al. [8] observed that the majority of the patients with acute cholecystitis present with pain in the abdomen (99.7%); 23% presented with jaundice. The reasons for advocating early cholecystectomy are: decreased total duration of hospital stay; decreased morbidity; avoidance of readmission to the hospital; and decreased overall costs of treatment. Somasekar et al., Cameron et al., and De Camp et al. advocated early cholecystectomy for acute cholecystitis [7, 8, 9]. The 2013 Tokyo guidelines support early surgery on first admission as the optimal management strategy for patients with non-severe acute cholecystitis. The Tokyo guidelines also provide recommendations specific to the grade of cholecystitis severity. Patients with mild (grade I) acute cholecystitis should be managed with cholecystectomy early on their first admission. For patients with moderate cholecystitis (grade II), early cholecystectomy is also recommended as the preferred management strategy. In the present study, the conversion rate from laparoscopic to open surgery was 1 out of 40 in the early group versus 3 out of 40 in the late group, respectively, which is comparable with the other studies and found to be statistically insignificant. No significant difference in conversion rates between the two groups was recorded in different studies by Kolla et al. [6], Verma et al. [10] and Johansson et al. [12]. In the present study, the mean duration of surgery was 40.71±10.47 minutes in the early and 52.73±10.92 minutes in the late laparoscopic cholecystectomy, respectively, with a p value of 0.0002, which is comparable with other studies. Yadav et al. [11], in their prospective randomised clinical trial in patients with acute calculus cholecystitis, found that the average operating time in the early group was significantly longer than the delayed group (57.8 minutes versus 66.7 minutes, p <0.05). Wound infection, biliary leakage, upper respiratory tract infection, prolonged ileus, and fever are the main postoperative complications associated with both early and delayed cholecystectomy in acute cholecystitis. Bile duct injury as an intra-operative complication is of major concern in both groups. Kolla et al. [6] and Johansson et al. [12] reported no significant difference in wound infection rate between the early and delayed surgery groups in acute cholecystitis. The wound infection rate in the present study was found to be 2.5% versus 5% between the two groups, which is

comparable with the other previous studies and found to be statistically insignificant ( $p > 0.05$ ). Verma et al. and Gul et al. [10, 13] reported no significant difference in the overall complication rate in either group. Sabre et al. [14] found that the overall complication rate was a little bit higher in the early laparoscopic cholecystectomy group, but the distribution was still insignificant. In the present study, the risk of postoperative infections and pain, along with the duration of hospital stay, was higher in the patients undergoing delayed laparoscopic cholecystectomy than in the patients undergoing early laparoscopic cholecystectomy, which is statistically significant. In the present study, the mean total hospital stay was  $3.50 \pm 1.50$  days in the early and  $5.73 \pm 4.91$  days in the late laparoscopic cholecystectomy, respectively. Papi et al. [15], in their meta-analysis, reported that the total hospital stay was shorter in the early surgery group (9.62.5 days versus 17.85.8 days;  $p < 0.0001$ ). Gurusamy et al. [16] said that the total hospital stay was about 4 days shorter in the early cholecystectomy group compared with the delayed group. There was no mortality in either group in the present study. It is consistent with Mishra et al. [17], who also observed no mortality in their studies [2, 6, 13].

#### Limitation (s) of study

The study's small sample size and short duration.

#### Conclusions:

Early cholecystectomy should be considered a planned procedure following adequate resuscitation and a complete assessment of the associated co-morbidity through the investigation and confirmation of the diagnosis. Early cholecystectomy is feasible and safe for acute cholecystitis and is a better method of treatment because of its shorter hospital stay, which is a major economic benefit to both the patient and the health care system. The level of difficulty in technique, peri-operative and post-operative complications, and hospital stay are higher in delayed laparoscopic cholecystectomy.

**Acknowledgement:** The authors would like to acknowledge the entire faculty and residents of the Department of surgery, Government Medical College and Hospital, Bettiah, West Champaran, Bihar, India, for their valuable support, time to time suggestion in undertaking present study. Special thanks to Dr. Khursheed Alam, Assistant Professor, Head of Department, Department of surgery, Government Medical College and Hospital, Bettiah, West Champaran, Bihar, India, gave valuable suggestions during the study.

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