

A Comparative Study of Early Versus Delayed Cholecystectomy among Patients with Mild to Moderate Acute Gallstone Pancreatitis

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Abstract

Objective: The current study aims to compare the early cholecystectomy outcomes with delayed cholecystectomy outcomes in cases involving mild to moderate acute gallstone pancreatitis (AGP).

Study Design: Observational Studies

Place and Duration: This study was conducted at, Makran Medical college, Turbat Pakistan for a period of 1 year from January 2024 date to January 2025.

Methods: The research comprised a total of 54 participants with mild to moderate AGP. The study allocated patients into two categories in a random manner: one group of patients had early cholecystectomy (n=27), and the other experienced delayed cholecystectomy (n=27). Laparoscopic cholecystectomy was performed on the Early Cholecystectomy (EC) group during the initial hospitalization, while surgery was performed on the Delayed Cholecystectomy (DC) group four weeks after they were discharged. Data on surgery duration, conversion rates, complications, hospital stay, and recurrent biliary events were collected.

Results: For the EC group, the median time to surgery was 6 days, but for the DC group, it was 30 days. The conversion rate of DC group and EC group to open surgery was 7.4% and 11.1%, respectively (p=0.6841). There were 25.9% perioperative complications in the EC group compared to 14.8% in the DC group (p=0.3155). The DC group had significantly higher recurrent biliary events (29.6%, p=0.0003). There was no mortality observed in either group.

Conclusion: For individuals with mild to moderate AGP, early cholecystectomy decreases the incidence of recurrent biliary events more than delayed cholecystectomy. This finding is supported by the benefits of early intervention along with a need for further studies to verify long term outcomes.

Keywords: Acute gallstone pancreatitis, early cholecystectomy, delayed cholecystectomy, recurrent biliary events, laparoscopic cholecystectomy.

INTRODUCTION

Gallstone pancreatitis (AGP) is a severe inflammatory condition of the pancreas caused by blocking of the pancreatic duct by gallstones [1, 2]. It is the leading cause of acute pancreatitis globally, complicating 35–40% of cases [3]. The most common cause of AGP is gallstones, which have a global prevalence of about 10 to 20% [4]. The prevalence of this condition also varies regionally. In the United States, 15% of the

adults are affected. In Europe, prevalence is from 5.9% to 21.9%. Asia has a generally lower prevalence, around 5.1% [5]. Gallstones continue to be the most common cause of acute pancreatitis in Pakistan with 35–45% of cases [6]. In Karachi, a tertiary care hospital study showed that 42 (45.2%) cases of acute pancreatitis were due to gallstones [7].

In AGP, the gallstone blocks the pancreatic duct or the ampulla of Vater, and pancreatic enzymes back up into the pancreatic tissue,

causing pancreatic inflammation. Factors resulting in blockage may include the size of the gallstone, multiple stones present, and anatomic features such as wide cystic duct [8, 9]. The condition ranges from mild to severe in its severity. Mild cases are typically those associated with temporary organ dysfunction without pancreatic necrosis [9]. The degree of severity of the disease determines the clinical manifestations of gallstone pancreatitis. Mild to moderate acute biliary pancreatitis (ABP) presents with upper abdominal pain, nausea and vomiting with elevated serum amylase and lipase [10]. In severe cases complications including infected necrosis of the pancreas, organ failure and high mortality rates may develop [11].

The American Gastroenterological Association and American College of Gastroenterology (ACG) guidelines for the management of mild acute biliary pancreatitis advocate surgical removal of the gallbladder or early cholecystectomy during the same hospital stay. According to ACG guidelines, cholecystectomy before discharge should be done for patients with mild acute pancreatitis and gallstones, in order to prevent recurrence of acute pancreatitis [12]. The AGA has recommended that the cholecystectomy should be undertaken during index admission, not postponed until a later discharge [13]. Delayed cholecystectomy, which is usually performed two to six weeks after the presenting symptoms have improved, usually has a shorter hospitalization length compared to early cholecystectomy. For instance, a study found that the early cholecystectomy group recorded a much shorter median length of hospital stay than the delayed cholecystectomy group (4 days vs. 7 days) [14]. Moreover, another study found that total hospital stay and costs were also higher for the delayed cholecystectomy group [15]. However, studies have also shown that in daily practice, cholecystectomy after mild biliary pancreatitis is often postponed for several weeks after hospital discharge, with cholecystectomy typically performed around 6 weeks after discharge [16].

Although early cholecystectomy has shown benefits in mild to moderate AGP, limited data from Pakistan specifically compare outcomes between early and delayed cholecystectomy. This comparative investigation aims to assess the length of hospital stay, conversion rates, perioperative complications, surgical duration, and incidence of recurrent gallstone-related complications in individuals who have an

episode of mild to moderate AGP undergoing early versus delayed cholecystectomy.

METHODOLOGY

In the current study, patients who were diagnosed with mild to moderate AGP were 18 years of age or older and gave written informed permission met the inclusion criteria and were included. Patients who had pleural effusion on imaging, severe pancreatitis (Ranson's score > 6), peripancreatic inflammation, pancreatic necrosis, or consistently high liver function tests (LFTs) were excluded. The ethical review committee of the hospital approved the study.

Two groups - Early Cholecystectomy (EC) and Delayed Cholecystectomy (DC) - were randomly allocated to the patients. Diagnosis of AGP was confirmed if the patient had epigastric tenderness, vomiting, acute upper abdominal pain, nausea, gallstones detected on ultrasonography and serum amylase levels greater than three times the normal limit and, elevated serum lipase. A Ranson's score of <3 indicated mild pancreatitis, but a score of 3-6 indicated moderate pancreatitis, meaning there were no imaging indications of organ failure or pancreatic necrosis.

During the index hospitalization, a laparoscopic cholecystectomy was carried out in the EC group. On the other hand, in the DC group, cholecystectomy was planned 4 weeks after hospital discharge. All patients received a single dose of intravenous second-generation cephalosporin during the induction of anesthesia. Both groups underwent laparoscopic cholecystectomy using a standard 4-port technique, with open cholecystectomy performed if needed.

Patients were monitored in the outpatient department for six months after surgery. Data were gathered using a standardized form about preoperative, intraoperative, and post-operative progress. The data gathered included perioperative problems, length of hospital stay, conversion rate, length of surgery, and frequency of recurrent gallstone-related complications. The statistical analysis was done using SPSS. When comparing percentage-based categorical data, the Chi-square test was used. A p-value below 0.05 was considered statistically significant.

RESULTS

A total of 54 individuals were considered for inclusion; none were excluded because of acute pancreatitis. With a mean age of 44.2 years, the participants' ages ranged from 18 to

75 years. The EC group had 27 patients, whereas the DC group included 27 patients. The demographic characteristics of the groups did not vary significantly. The median time to surgery for the EC group was 6 days, but for the DC group, it was 30 days. The rate at which the EC group had open surgery was not significantly different from the DC group, which was 11.1% and 7.4%, respectively ($p = 0.6841$). The EC group had a surgery duration of 56 minutes, a little longer than the DC

group's 42 minutes, but the difference was not statistically significant ($p > 0.98$). Perioperative complications were more frequent in the EC group (25.9% vs. 14.8%), though not significantly different ($p = 0.3155$). A significant difference was noted in recurrent biliary events, with 29.6% of the DC group experiencing these complications ($p = 0.0003$). No mortality was observed in either group (Table 1).

Table 1: Perioperative Outcomes: Early Versus Delayed Cholecystectomy

Outcome	Early Cholecystectomy (n=27)	Delayed Cholecystectomy (n=27)	p-value
Conversion to open surgery (n, %)	3 (11.1%)	2 (7.4%)	0.6841
Perioperative complications (n, %)	7 (25.9%)	4 (14.8%)	0.3155
Duration of surgery (mins), median, IQR	56 (40-60)	42 (30-60)	>0.98
Post-operative complications (n, %)	2 (7.4%)	1 (3.7%)	>0.98
Post-operative hospital stay (days), median, IQR	2.5 (1.5-3)	2 (1.4-3)	>0.98
Recurrent biliary events (n, %)	0	8 (29.6%)	0.0003
Mortality (n, %)	0	0	N/A

^a $p < 0.05$ = significant

^b Fischer exact test

^c Inter Quartile Range

In the DC group, 8 out of 27 patients (29.6%) experienced recurrent biliary events. Of these, 4 patients (14.8%) had biliary colic, 3 patients (11.1%) developed acute cholecystitis, and 1 patient (3.7%) had recurrent biliary pancreatitis. Among the 8 patients who

required hospital re-admission, 6 (75%) experienced recurrent biliary events, with 2 (25%) presenting with biliary colic, 1 (12.5%) with acute cholecystitis, and 1 (12.5%) with recurrent biliary pancreatitis (Table 2). These findings represent a significantly higher rate of recurrent biliary events in the DC group compared to the EC group, with most of the recurrent events leading to hospital re-admissions.

Table 2: The Impact of Delayed Cholecystectomy on Recurrent Biliary Events

Outcome	Number of recurrent biliary events	Biliary colic	Acute cholecystitis	Recurrent biliary pancreatitis
Delayed Cholecystectomy (n=27)	8 (29.6%)	4 (14.8%)	3 (11.1%)	1 (3.7%)
Hospital Re-admission (n=8)	6 (75%)	2 (25%)	1 (12.5%)	1 (12.5%)

DISCUSSION

This research aimed to assess delayed vs early cholecystectomy outcomes in individuals with mild to moderate AGP. With an emphasis on surgical results, recurrent biliary occurrences, and overall patient recovery, we aimed to assess the safety, effectiveness, and problems

related to each approach. Gallstones are still a major cause of acute pancreatitis, and if the underlying cause is not treated right once, recurring episodes are likely to occur [14, 17]. Cholecystectomy is regarded as the final treatment for preventing recurrence, however, the exact timing of the operation has been

debated [12]. There is growing evidence that early cholecystectomy, usually done during the initial hospital stay, is beneficial for mild AGP [18]. According to an Observational Studies, cholecystectomy performed within two days of admission results in fewer hospital stays than those performed after 48 hours [19]. Moreover, it has also been stated that the early procedure has fewer risks of recurrent biliary issues, reduced post-operative complications, and fewer technical difficulties [19]. Additionally, a study has reported that if cholecystectomy is performed within 24 hours of admission, it is directly correlated with a shorter duration of surgery as well as a shorter length of stay [20]. However, it may result in an insignificant increase in minor complications [20].

Our findings indicate that early cholecystectomy performed during the index hospitalization significantly reduces the risk of recurrent biliary events compared to delayed cholecystectomy. These results align with several international studies that advocate for early cholecystectomy in mild to moderate AGP. For instance, a systematic review and meta-analysis by Prasanth et al. (2022) involving 11 Observational Studies with 1,176 participants demonstrated a significant reduction in recurrent biliary events and recurrent pancreatitis in patients undergoing early cholecystectomy compared to those with delayed surgery [21]. Another study in Nepal showed that recurrent biliary events occurred more often in the delayed group than the early group, however, no events occurred in the early group [22].

Specifically, in our analysis, the rate of open surgery conversion in the EC group was 11.1%, which was greater than in the DC group's rate of 7.4%. However, the difference is found to be insignificant between the two groups. These figures are consistent with findings from other studies, such as a cohort study from the United States observing conversion rates of 0.24% for immediate, 0.37% for early, and 2.46% for delayed laparoscopic cholecystectomy [23]. This indicates that timing of cholecystectomy does not substantially affect conversion rates. Our finding is also in line with a Nepalese study, which reported a conversion rate of 5.26% in the early group with no statistical difference [22]. Regarding operative duration, we found median operative duration to be 56 minutes for EC and 42 minutes for DC with no statistical difference ($p > .98$). This is consistent with a study, which reported a

much longer operating time for the early group (120 minutes) compared to the delayed group (80 minutes), suggesting that delayed operations might have experienced logistical difficulties or the need to use surgical trainees in case of urgency [24].

Perioperative complications in our study were seen in 25.9% of the EC group and 14.8% of the DC group ($p = 0.3155$); no significant difference was noted. Nonetheless, post-operative complications in the EC (7.4%) and DC (3.7%) groups without significant differences were observed. The results align with a study by Hussain et al. in Peshawar, Pakistan which found the complication rate of 11% for the EC group and 9.5% for the DC group, with no significant difference [25]. Furthermore, another study in Nepal showed no differences in intraoperative complications between EC and DC groups [22]. Our results show that there is no difference in the risk of perioperative or post-operative complications between delayed and early cholecystectomy. Moreover, no statistically significant difference ($p > 0.98$) was observed in the median post-operative hospital stay between the EC and DC groups, which was 2.5 and 2 days, respectively. In contrast, the same Nepalese study reviewed a significantly shorter hospital stay of the EC group (5.42 days) as compared to the DC group (9.36 days) [22].

One of the most important findings of our study was the significantly higher incidence of biliary events that occurred more than once in the DC group (29.6% vs. 0% in the EC group; $p=0.0003$). This is consistent with a systematic review and meta-analysis performed by Prasanth et al., which showed that the relative risk for recurrent biliary events favoring early cholecystectomy was 0.10, or a significant reduction in the risk of recurrence with early surgery [21]. In the DC group, about 14.8% of the participants experienced biliary colic episodes, slightly lower than the 26% in study by Jaiswal et al. [20]. Furthermore, our findings show no mortality in either groups, in accordance with other studies, including the Nepalese study, which also found no mortality in either group [22]. These results indicate that an early cholecystectomy is a safe procedure with a low mortality rate.

There are several limitations in this study. First, the findings may be limited in their generalizability to other contexts or regions due to the fact that they were conducted at a single hospital. Secondly, the findings may not be statistically significant since the sample size was limited to 54 individuals. Furthermore, the

limited follow-up time of six months may not be adequate in effectively characterizing long term outcomes or recurrence of complications.

CONCLUSION

Patients with mild to moderate AGP undergoing early cholecystectomy during the index hospitalization have a significantly reduced risk of further biliary events compared with those undergoing a delayed cholecystectomy. In that regard, our findings are similar to other international studies supporting early intervention, as there was fewer complications and shorter hospital stays in early cholecystectomy group. In contrast, the delayed cholecystectomy group had greater recurrent biliary events and many hospital readmissions. More research with a bigger study sample and longer duration and follow-up should be conducted to validate these findings and to find out how early cholecystectomy helps in the long run with patient outcomes and recurrence prevention.

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