

Safety of early same-admission laparoscopic cholecystectomy for acute mild biliary pancreatitis. A retrospective study for acute pancreatitis

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Abstract

Introduction: As the standard procedure for the surgical treatment for gallbladder stones, we investigated the controversy surrounding the optimal time for laparoscopic cholecystectomy (LC) for acute mild biliary pancreatitis (AMBP).

Aim: To further address the optimal timing of LC, we conducted a retrospective study comparing early (< 72 h, group I) with delayed (> 72 h, group II) LC for AMBP during the same admission.

Material and methods: This retrospective study included medical records of all patients who were admitted with a diagnosis of acute mild biliary pancreatitis at Dongyang People's Hospital from July 2011 to June 2019.

Results: A total of 119 patients were divided into an early LC group (group I; 52 patients) and a control group (group II; 67 patients). Conversion to open cholecystectomy (COC) was performed in 17 patients (6 patients in group I and 11 patients in group II, $p = 0.62$). There were no significant differences in terms of estimated blood loss and duration of surgery ($p = 0.08$ and $p = 0.64$, respectively). The overall hospital stay in group I was significantly shorter than in group II (10.86 ± 3.21 vs. 13.29 ± 4.51 days, $p = 0.001$). Compared with postoperative bile leakage ($p = 0.72$) and postoperative morbidity ($p = 0.97$) and mortality, there were no significant differences between the groups.

Conclusions: Early LC during the same admission is safe for acute mild biliary pancreatitis and has the advantage of shortening overall hospital stay. There was no significant increase in COC, bile duct injury, and complications.

Key words: acute pancreatitis, laparoscopic cholecystectomy, complication, mild.

Introduction

Acute pancreatitis, one of the common causes of acute abdomen in the emergency department, is associated with significant morbidity and even mortality [1, 2]. Acute biliary pancreatitis (ABP) accounts for about 30–55% of acute pancreatitis [3–5], and around 80% of affected patients have acute mild biliary pancreatitis (AMBP) [6]. Cholecystectomy is thought to significantly reduce the further incidence of biliary events such as recurrence of ABP, cholecys-

titis, and cholangitis [7–11]. During the past few decades, with the development of minimally invasive devices and techniques, laparoscopic cholecystectomy (LC) has become the standard procedure for removal of the gallbladder. However, the major complications of LC include bile duct injury (BDI) among others [12, 13].

A key issue concerning AMBP is the optimal time of LC to treat AMBP. Results from earlier studies and guidelines have led to most recent reports recommending early surgery [14–16]. Such recommenda-

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tions, however, are based on a low level of evidence. On the other hand, the definition of “early” has varied in previous studies and there is no universally accepted definition of “early.” The interval for onset of symptoms to surgery varied from 48 h to 2 weeks. Those in favor of early surgery cite reduction of the recurrence of biliary-related events, shortened hospitalization time, and lower costs [17, 18]. The opposite view states that early surgery may increase the incidence of postoperative complications resulting from edema. Therefore, the current view on the timing of surgery for AMBP remains unclear.

Aim

To further address the optimal timing of LC, we conducted a retrospective study comparing early (< 72 h) with delayed (> 72 h) LC for AMBP during the same admission. In this study, we defined “early LC” as surgery within 72 h from onset of symptoms. Judgment of the severity of pancreatitis and the preoperative examination of LC can generally be completed within 72 h.

Material and methods

Patients

In this retrospective study, the medical records of patients with AMBP from July 2011 to June 2019 were collected. Ethical approval was obtained from the hospital research committee before commencement of the study. Medical measures included age, gender, laboratory findings, body mass index (BMI), American Society of Anesthesiologists (ASA) and perioperative characteristics. The severity of postoperative complications were according to the Clavien-Dindo classification [19].

Inclusion criteria

The diagnosis of ABP was based on the following criteria: (1) epigastric pain; (2) serum amylase or lipase levels at least three times the upper limit of normal; (3) characteristic findings of acute pancreatitis on cross-sectional abdominal imaging; (4) documented gallstones and absence of other factors known to cause pancreatitis. The severity of ABP was defined by the Bedside Index of Severity in Acute Pancreatitis (BISAP) [20]. Patients with a BISAP score ≤ 2 were classified as having mild pancreatitis.

Exclusion criteria

The exclusion criteria were as follows: (1) patients with severe pancreatitis (BISAP ≥ 3); (2) suspected or proven acute cholangitis or common bile duct (CBD) stones; (3) jaundice with total bilirubin ≥ 2 mg/dl; and (4) history of previous abdominal surgery, malignancy, and previous endoscopic retrograde cholangiopancreatography (ERCP).

Treatment

The patients with AMBP were divided into two groups according to the timing of LC: patients in group I underwent LC within 72 h from onset of symptoms, and group II patients underwent LC after 72 h. The initial treatment included nil by mouth, fluid and electrolyte replacement, analgesia, oxygen administration, and nasogastric intubation if necessary. Magnetic resonance cholangiopancreatography was performed during the waiting time. All operations were completed by five experienced surgeons with over 10 years of experience. All cholecystectomy procedures were performed laparoscopically with a standard 3- to 4-port technique.

Statistical analysis

Continuous variables were expressed as mean \pm standard deviation and categorical variables as number and percentage. For categorical variables, the χ^2 or Fisher's exact test was performed. We also used Student's *t*-test for independent groups for comparison with respect to measurable variables. IBM SPSS Chicago, IL Statistics version 22 was used for statistical analyses. $P < 0.05$ was considered statistically significant.

Results

A total of 119 patients with AMBP who underwent LC from July 2011 to June 2019 were retrospectively reviewed. The patients' main characteristic and laboratory values are shown in Table I. The patients' mean age was 60.5 years (range: 30–79 years). According to the inclusion and exclusion criteria, 119 patients were divided into two groups (57 patients in group I and 67 patients in group II). The mean BISAP score was 1.28 in group I and 1.34 in group II. There were no significant differences with respect to mean age, gender, and main laboratory data. The mean thickness of the gallbladder

Table I. Demographic and clinical characteristics

Parameter	Group I (n = 52)	Group II (n = 67)	P-value
Age [years]	61 ±3.52	60 ±2.97	0.55
Sex (male : female)	29 : 23	35 : 32	0.84
Gallbladder wall [mm]	3.41 ±0.3	3.52 ±0.6	0.23
Cholecystitis	9	7	0.27
Biliary lithiasis	7	6	0.43
CBD size [mm]	5.5 ±1.2	5.7 ±1.1	0.39
BISAP score	1.28 ±0.68	1.34 ±0.52	0.58
BMI [kg/m ²]	28 ±2.13	27 ±2.33	0.
ASA class (I : II : III)	26 : 20 : 6	32 : 28 : 7	0.93
CRP [mg/l]	82.19 ±26.45	89.17 ±30.19	0.18
WBC [× 10 ⁹ /l]	1.85 ±1.18	1.92 ±1.16	0.75
Glucose [mmol/l]	5.29 ±2.64	5.38 ±2.73	0.85
AST [U/l]	58.26 ±12.68	54.91 ±13.18	0.16
TB [μmol/l]	12.65 ±1 0.26	15.49 ±9.78	0.13
DB [μmol/l]	6.64 ±6.59	6.69 ±7.58	0.97
BMI [kg/m ²]	24.68 ±6.59	23.94 ±5.58	0.45
Amylase [U/l]	849.32 ±67.86	831.45 ±72.63	0.17
Lipase [U/l]	798.26 ±56.94	803.64 ±60.19	0.62
Time to surgery [h]	32 ±6.89	84 ±12.89	< 0.01

BISAP – bedside index for severity in acute pancreatitis, BMI – body mass index, ASA – American Society of Anesthesiologists, CRP – C-reactive protein, WBC – white blood cells, AST – aspartate aminotransferase, ALT – alanine transaminase, TB – total bilirubin, DB – direct bilirubin.

wall and CBD size were similar in the two groups. Patients in group I underwent LC at a mean of 32 h compared with 84 h for those in group II (32 ±6.89 vs. 84 ±12.89, $p < 0.01$).

Biliary-related events and intraoperative outcomes are shown in Table II. The rate of recurrent pancreatitis was higher in group II than in group I (7 vs. 0, $p = 0.04$). There were no significant differences in terms of duration of surgery and estimated blood loss between the groups (72.18 ±29.63 days

vs. 69.54 ±32.19 days, $p = 0.64$; 75.49 ±19.38 ml vs. 82.19 ±21.93 ml, $p = 0.08$). The number needing drainage in group I was higher than in group II, but without significance ($p = 0.65$) (Table II).

A total of 17 patients underwent conversion to open cholecystectomy (COC) (6 vs. 11, $p = 0.62$), the pattern of which is shown in Table III. The main reason for COC was difficulty in detecting Calot's triangle (4/6 vs. 7/11, $p = 0.68$). One patient from each group suffered BDI. Open and bile duct–jeju-

Table II. Biliary events and intraoperative outcomes

Variable	Group I (n = 52)	Group II (n = 67)	P-value
Recurrent pancreatitis	0	7	0.04
Cholecystitis	1	2	0.82
Gallstone colic	3	5	1.00
Duration of surgery [min]	72.18 ±29.63	69.54 ±32.19	0.64
Estimate blood loss [ml]	75.49 ±19.38	82.19 ±21.93	0.08
Drainage	12	7	0.11
Duration of drainage [days]	3.37 ±1.25	3.27 ±1.18	0.65

num Roux-en-Y were performed in 2 patients. One patient in group I and 2 in group II were found to have obscure anatomy around the gallbladder. One patient in group II suffered uncontrolled bleeding (Table III).

Bile leakage occurred in 4 patients in group I and 3 in group II. These 7 cases were treated with no further invasive procedure and recovered stably. Incision infection was found in 6 patients (3 in group I and 3 in group II). According to the Clavien-Dindo classification of postoperative complications, 13 patients were in Grade I-II (6 in group I and 7 in group II, $p = 0.91$) and 4 were in Grade III-IV (2 in each group, $p = 0.79$). The overall hospital stay was 10.86 days in group I compared with 13.39 days in group II (10.86 ± 3.21 vs. 13.29 ± 4.51 , $p = 0.01$). No patients required reoperation or readmission, although 2 patients needed postoperative ERCP for CBD stones. Postoperative outcomes are shown in Table IV.

Discussion

Studies of the treatment of AMBP have shown the importance of LC in reducing the rate of recurrence. However, the optimal timing for LC is yet to be ascertained. The research presented here confirms that early LC during the same admission is safe for AMBP and could shorten the overall hospital stay.

Over the past decades, studies focused on the optimal timing of LC for AMBP have attracted much attention. Owing to the fear of increasing perioperative risks, many surgeons preferred to perform delayed LC after AMBP [21, 22]. However, this approach was associated with higher recurrence of biliary-related events, especially recurrent ABP. A previous meta-analysis showed that 18% of patients were readmitted after biliary-related events [14]. Therefore, most recent studies advise early LC after AMBP. A prospective study conducted by Aboulian *et al.* demonstrated that LC within 48 h of admission is safe [17]. The PONCHO study also showed

Table III. Pattern of COC

Variable	Group I (n = 52)	Group II (n = 67)	P-value
COC:	6	11	0.62
Difficult Calot's triangle	4	7	0.84
BDI	1	1	0.59
Uncontrolled bleeding	0	1	0.89
Unclear obscure anatomy ^a	1	2	0.82

COC – conversion to open cholecystectomy, BDI – bile duct injury; ^aadhesions between omentum, gall bladder, peritoneum, and surrounding tissues around gallbladder.

Table IV. Postoperative outcomes

Variable	Group I (n = 52)	Group II (n = 67)	P-value
Bile leak	4	3	0.72
BDI	1	1	0.59
Incision infection	3	3	0.92
Total complication	8	9	0.97
Clavien-Dindo classification			
Grade I-II	6	7	0.91
Grade III-IV	2	2	0.79
Mortality	0	0	
Overall hospital stays [days]	10.86 ±3.21	13.29 ±4.51	0.001
Re-operation	0	0	
Re-admission	0	0	0.59
Postoperative ERCP	2	2	0.79

BDI – bile duct injury, ERCP – endoscopic retrograde cholangiopancreatography.

that same-admission LC could reduce the rate of recurrent biliary pancreatitis [23]. The guideline of the British Society of Gastroenterology recommended LC within 2 weeks of discharge [16], whereas others provided different recommendations. Thus it is unclear whether LC performed within 72 h from onset of symptoms is safe for AMBP. A recent Cochrane review demonstrated that LC performed within 3 days was safe and could shorten the total hospital stay [24]. To our best knowledge, there are only four randomized controlled trials (RCTs) in the previous literature. It is thus necessary and important to conduct a retrospective study given the difficulty of predicting the progression of pancreatitis. In our retrospective study, LC performed within 72 h demonstrated safety equal to that performed after 72 h. According to the Clavien-Dindo classification of postoperative complications, there were no significant differences in terms of major complications. BDI and postoperative bile leakage, the main biliary-related complications, showed no differences between our two groups. Most previous studies measured the severity of biliary pancreatitis using the Ranson score. The Ranson criteria require 48 h for completion, thus missing the potentially valuable early treatment. In 2008, the BISAP was proposed to predict severe acute pancreatitis [20]. Previous studies have demonstrated that the BISAP score is a reliable tool for identifying acute pancreatitis patients [25, 26]. The present study is the first to use BISAP for classification of pancreatitis, which can potentially shorten the waiting time before surgery.

Consistent with previous research, our study showed that early LC could reduce the rate of recurrent pancreatitis. The study conducted by Ito *et al.* showed that 32% of patients were readmitted because of pancreatitis while waiting for LC [27]. Another concern about early surgery is that it may increase postoperative ERCP. Two patients from each of our groups underwent postoperative ERCP, with no discernible significant difference. However, future studies with larger samples are necessary.

The possible increase in the COC rate is considered the reason why many surgeons choose delayed LC. Previous studies demonstrated that early LC may be more technically challenging because of the edema and inflammation [28, 29]. This view is changing as laparoscopic technology continues to advance. In a study by Aksoy *et al.*, the main

reason for COC in the early group was obscure anatomy (including Calot's triangle), and no significant differences from the delayed group were observed, in line with the results of our study, where the main reason for COC was difficulty in detecting Calot's triangle. Compared with later LC, early LC was not associated with an increase in detecting Calot's triangle.

One advantage of early LC is that it leads to a shorter hospital stay. Previous retrospective and prospective studies showed that earlier LC was associated with decreasing stays in hospital [28]. The conclusion of these studies, namely that earlier surgery results in a shorter hospital stay without an increase in complication rates, is consistent with the inference of the present study.

Limitations of our study include the retrospective study design and small sample size considerations. BISAP is mainly used to predict the severity of pancreatitis and for early identification of patients at increased risk for in-hospital mortality. However, BISAP is simpler than other pancreatitis scoring systems, and is now widely used in clinical practice. In addition, patients may prefer to choose early surgery, which could lead to selection bias. More large-scale, high-quality RCTs are required in the future.

Conclusions

Early LC performed within 72 h from onset of symptoms is safe for AMBP and has the advantage of shortening the overall hospital stay. There was no significant increase in conversion rate, BDI, and complications. Notwithstanding potential limitations, future high-quality RCTs are necessary.

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Conflict of interest

The authors declare no conflict of interest.

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