Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/h6ysfd63

OUTCOME OF EARLY VERSUS DELAYED LAPAROSCOPIC CHOLECYSTECTOMY IN ACUTE CHOLECYSTITIS AT TERTIARY CARE CENTRE, KARACHI

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Abstract

Introduction:

Gallstone disease is common across the world, with varied frequency in various locations. The conventional therapy for symptomatic cholelithiasis is laparoscopic cholecystectomy (LC), however the scheduling of operation is still controversial. Early laparoscopic cholecystectomy (ELC) yields better clinical results than delayed laparoscopic cholecystectomy (DLC) for acute cholecystitis. Conversion to open cholecystectomy during LC is a significant consequence, and patients with comorbidities, advanced age, prior abdominal surgery, and low albumin levels are at higher risk. Studies show that ELC is safe, reduces hospital stays, and lowers costs compared to DLC.

Aims & Objective:

The purpose of this study was to compare outcomes like bile leak, mean operation time, hospital stay duration, and conversion between patients with acute cholecystitis who underwent early versus delayed laparoscopic cholecystectomy.

Methods:

An observational study was conducted on surgical ward two at Karachi, Pakistan's Jinnah Postgraduate Medical Centre (JPMC) between October 2020 and October 2022. Patients undergoing laparoscopic cholecystectomy for acute cholecystitis were considered for the study. Patients were split into two groups: Group A underwent surgery within seven days of the acute incident, while Group B waited 6-8 weeks after the acute incident to have surgery. Operative duration, hospital stay, bile leak, and rate of conversion were all recorded for both groups. To examine the information, we used SPSS 28.

Results:
The study included patients with a mean age of 42.15, ranging from 18 to 70. In Group A, 16.3% were men, 83.3% were women, while in Group B, 9.5% were men, and 90.5% were women. The mean operative duration in Group A was 98.42 ± 46.25 minutes; the mean hospital duration was 2.47 ± 1.08 days; conversion occurred in 4 (9.5%) patients, and bile leak occurred in 11.9% of patients. In Group B, the mean operative time was 73.28 ± 27.81 minutes, the mean hospital stay was 2.45 ± 1.06 days, and bile leak occurred in 1(2.4%) patient.

Conclusion:
Group B had significantly shorter mean surgical durations, lower rates of bile leakage, and lower rates of conversion to open cholecystectomy than Group A, despite there being no statistically significant difference in the length of hospital stays between the two groups.

Keywords: Gallstone disease, Laparoscopic cholecystectomy, Acute cholecystitis, Operative time, Hospital stay duration, Bile leak.

INTRODUCTION:

Gallstone disease (GSD), a common condition affecting the pancreaticobiliary system, poses numerous challenges for patients and healthcare providers. GSD prevalence varies globally and is a frequent indication for surgical intervention, leading to increased healthcare costs. Approximately 10% of adults in the United States are affected by gallstones, while the prevalence ranges from 5.9% to 21.9% in Western Europe [1]. In Asia, reported prevalence rates range from 3.2% to 15.6%[2].

Gallstone-related health problems like cholecystitis, pancreatitis, and cholangitis are serious. They occur when the chemical balance of bile in the gallbladder is disrupted, causing excess cholesterol to crystallize and form gallstones. Although over 10% of people develop gallstones, only a small percentage experience symptoms [3]. Cholesterol gallstones are more likely to occur in individuals who are advanced in age, have a specific gender, or have a genetic predisposition. Unfortunately, as the global population ages and obesity and diabetes epidemics persist, the incidence of gallstones is expected to increase worldwide [4].

When gallstones become bothersome, laparoscopic cholecystectomy (LC), a minimally invasive treatment for their removal, is indicated[5]. The best time to do LC in instances of acute cholecystitis with cholelithiasis is still being debated. Early LC is done within 7 days after diagnosis and delayed LC, which entails conservative treatment followed by cholecystectomy during a second hospital stay, usually six to twelve weeks later [6]. Numerous randomized controlled trials have been conducted to evaluate the clinical consequences of both early and delayed LC. 2019 research published in the Asian Journal of Endoscopic Surgery found that early LC for acute cholecystitis resulted in better clinical results than delayed LC [7]. Similar findings were reported in a 2018 study published in Annals of Surgery [8], which concluded that cholecystectomy performed at an earlier rather than later stage is safe, and results in a shorter hospital stay, less time spent on antimicrobial treatment, and lower overall costs [8].

This study tries to establish the ideal time for surgery, with an emphasis on Pakistan, where data is scarce. The major goal of this study is to evaluate the results of early versus delayed LC in people with acute cholecystitis, especially bile leak, mean surgical time, hospital stay duration, and conversion rates.

METHODOLOGY:

Ethics approval

The research was conducted in accordance with the Declaration of Helsinki. The Institutional Review Board (IRB) of Jinnah Postgraduate Medical Centre (JPMC), Karachi (75510), evaluated and approved this study under the reference number IRB NO. F2-81/2022-GENL/309/310/JPMC, and the Senior Registrar of JPMC granted permission to collect data. The patient's written informed consent for publication and any accompanying images was obtained.

Study Design

At Jinnah Postgraduate Medical Center in Karachi, an observational study was conducted to report the operative time statistics of early and delayed laparoscopic cholecystectomy. The operative time for early laparoscopic cholecystectomy was reported as 80 (60-95) using an online converting calculator, converted into mean and SD values of 78.75 and 10.099. Similarly, delayed laparoscopic cholecystectomy operative time was reported as 85 (60-120) and was converted into mean and SD values of 87.5 and 17.329. The power of the test was 80%, and the calculated sample size for each group was 42, making the total sample size 84 patients. All patients aged 18-80 years, regardless of gender, who were diagnosed with acute cholecystitis were included in the study. Acute cholecystitis was defined as a patient with right hypochondrium pain (Visual Analogue Scale VAS >4), tenderness on palpation (assessed clinically), increased Total Leucocyte Count (>10,000), and an ultrasound showing gallstones (appearing as acoustic shadows), pericholecystic fluid (fluid around the gall bladder on ultrasound), and a thickened gall bladder wall (>3mm). To analyze the data, SPSS version 28 was used.

Source of Data

We collected the data by reviewing the medical records of patients who were admitted to Ward 2 of the Department of General Surgery at Jinnah Postgraduate Medical Center from October 2020 to October 2022 in a prospective manner.

Element of Data

The study measured operative time, bile leak, conversion, and hospital stay duration. However, patients with obstructive jaundice, a history of abdominal surgery, acute gallstone pancreatitis, or ultrasound-confirmed choledocholithiasis were excluded. The study also analyzed various variables such as age, operative time, hospital stay duration, gender, diabetes mellitus (known cases with at least one year of medication), hypertension (known cases with at least one year of medicine), obesity (BMI>30), conversion to open cholecystectomy, and bile leak.

Data Collection Procedure

Patients who satisfied the criteria and were admitted to the Department of Surgery ward two at JPMC, Karachi, were included in the research after JPMC gave approval. These patients were allocated to either Group A or Group B randomly. Following the written agreement, eligible patients were asked to select a slip from a set of mixed-up slips, half of which included the letter "A" and the other half contained the letter "B," to assign them to the appropriate group. Group A had a laparoscopic cholecystectomy within seven days after developing acute cholecystitis, while Group B had a laparoscopic cholecystectomy seven days later. After completing a fellowship, consultants performed all procedures in surgical ward two, who had at least five years of experience.

Data Analysis Procedure

An independent t-test was used to compare the outcomes, which include operation duration and hospital stay duration. The chi-square test, on the other hand, was employed to compare bile leak, difficult anatomy, and conversion. A p-value of less than 0.05 was regarded as significant. Age, gender, diabetes mellitus, and prior abdominal surgery were all considered during stratification and

post-stratification. The chi-square test was employed to investigate conversion, bile leakage, and complicated anatomy, whereas an independent t-test was utilized to investigate surgical time and hospital stay. A p-value of less than 0.05 was deemed significant.

RESULTS:

The study included patients aged 18 to 70 years, with a mean age of 42.15 years and a standard deviation of 11.75. In group A, the mean age was 40.47 ± 10.91 years, while in group B, it was 43.83 ± 12.44 years. Among the patients in group A, 7 (16.7%) were male, and 35 (83.3%) were female, while in group B, 4 (9.5%) were male, and 38 (90.5%) were female. Regarding comorbidities, in group A, none of the patients had obesity, 3 had hypertension (HTN), and 2 had hypertension and diabetes mellitus (DM). In contrast, in group B, one patient had DM, 8 had HTN, and 1 had both DM and HTN.

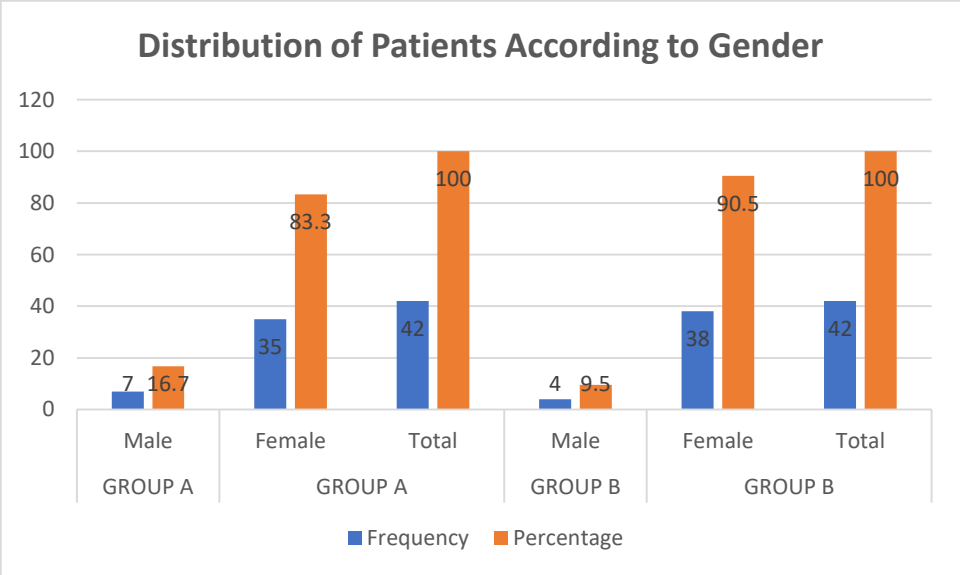
"Table.1 Distribution of Patients According to Age"

Statistic	Group A	Group B
Total Participants n	42	42
Mean Value	40.4762	43.8333
Median Value	40	43.5
Mode Value	40	60
Standard Deviation(SD)	10.9126	12.44288
Minimum	18	24
Maximum	70	70

"Table.2 Distribution of Patients According to Gender"

GROUP	Gender	Frequency	Percentage
GROUP A	Male	7	16.7
	Female	35	83.3
	Total	42	100
GROUP B	Male	4	9.5
	Female	38	90.5
	Total	42	100

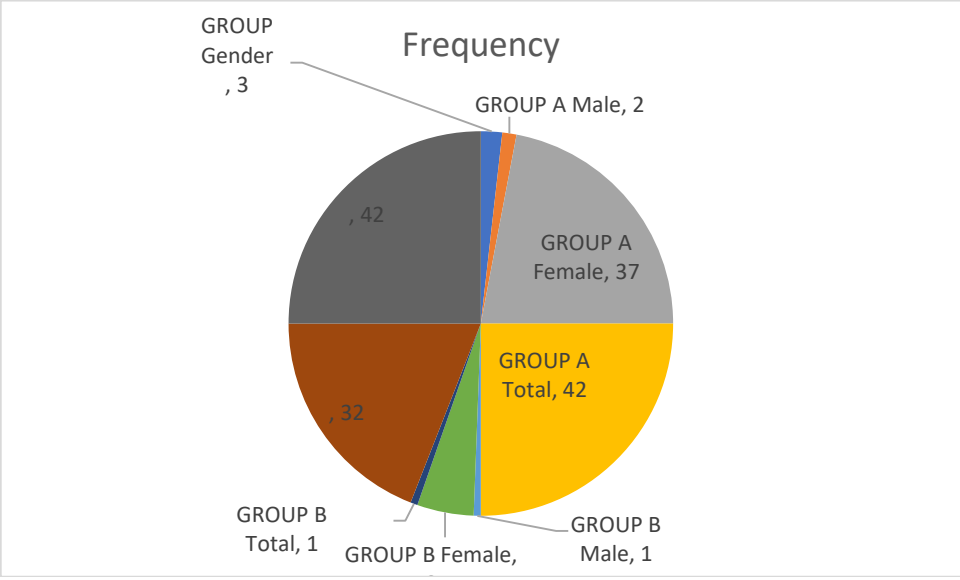
Figure: 2



"Table.3 Distribution of Patients According to Co-morbidities"

GROUP	Co-Morbid	Frequency	Percentage
Group A	HYPERTENSION	3	7.1
	DM+HTN	2	4.8
	NKCM	37	88.1
	Total	42	100
Group B	DIABETES MELLITUS	1	2.4
	HYPERTENSION	8	19
	DM+HTN	1	2.4
	NKCM	32	76.2
	Total	42	100

Figure: 1



Mean Operative Time:

Our study compared the operative time for early and delayed laparoscopic cholecystectomy between two groups, A and B. Group A had a mean operative time of 98.42 ± 46.25 minutes, and group B had a mean operative time of 73.28 ± 27.81 minutes. Our analysis using an independent t-test showed a significant difference between the two groups, with a p-value of 0.003. Group A had a minimum operative time of 45 minutes and a maximum of 250 minutes, with a mean plus standard deviation of 46.25 minutes. In contrast, group B had a minimum operative time of 30 minutes and a maximum of 145 minutes, with a mean plus standard deviation of 27.81 minutes.

"Table.4 Mean & Standard Deviation of Operative Time".

GROUP		Mean	Std. Deviation	P-Value
GROUP A	OPERATIVE TIME IN MINUTES	98.4286	46.25546	
GROUP B	OPERATIVE TIME IN MINUTES	73.2857	27.81409	0.003

Mean Hospital Duration:

The average hospital stay in Group A was 2.47±1.08 days. In Group B, the hospital stay was 2.45±1.06 days. We discovered no significant difference in hospital stay between the two groups using the independent t-test, with a p-value of 0.91. In group A, the minimum hospital stay is one day. The maximum hospital stay was five days. The mean standard deviation was 1.08 days, whereas the smallest hospital stay in group B was 1 day and the maximum hospital length was 5 days. The standard deviation was 1.06 days on average.

Table.5 Comparison of Length of Hospital Stay (in days) between Groups.

GROUP	Length of Hospital stay (in days)		P-Value
	n	Mean+ - Std. Deviation	
GROUP A	42	2.47 +- 1.08	0.919
GROUP B	42	2.45+-1.06	

Conversion to Open Cholecystectomy:

Out of the patients in group A, 4 (9.5%) had to undergo open cholecystectomy, while none of the patients in group B needed the same. According to Chi-squared analysis, undergoing laparoscopic cholecystectomy early on was linked with a greater chance of experiencing bile leak, with a p-value of 0.090.

"Table-.6 Cross tabulation of Conversion to open surgery with Groups"

GROUPS	CONVERSION TO OPEN SURGERY		Total	p-VALUE
	YES	NO		
GROUP A	4(100.0%)	38(47.5%)	42(50%)	0.040
GROUP B	0(0.0%)	42(52.5%)	42(50%)	
TOTAL	4(100%)	80(100) %	84(100%)	

Bile leaks

Bile leakage occurred in 5 patients in group A (11.9%) and 1 patient in group B (2.4%). Early laparoscopic cholecystectomy was related to conversion to open surgery (p-value=0.040), as determined by Chi-squared.

"Table.7 Cross tabulation of Bile leak with Groups"

GROUPS	BILE LEAK		Total	p-VALUE
	YES	NO		
GROUP A	5(83.3%)	37(47.4%)	42(50%)	0.090
GROUP B	1(16.7%)	41(52.6%)	42(50%)	
TOTAL	6(100%)	78(100) %	84(100%)	

Anatomical abnormalities

Anatomical abnormalities were found in 20 patients (47.6%) in group A and 9 patients (21.4%) in group B. The chi-square test revealed no correlation between the type of laparoscopic cholecystectomy and anatomical abnormalities, with a p-value of 0.012.

"Table.8 Cross tabulation of anatomical abnormality with Groups"

GROUPS	ANATOMICAL ABNORMALITY		Total	p-VALUE
	YES	NO		
GROUP A	20(69.0%)	22(40%)	42(50%)	0.012
GROUP B	9(31.0%)	33(60%)	42(50%)	
TOTAL	29(100%)	55(100) %	84(100%)	

Stratification analysis showed that age, gender, and comorbid conditions did not significantly affect bile leak occurrence. Age and gender did not affect the operative time, while age affected hospital stay, with middle-aged patients (age 35-45 years) having the shortest hospital stay. Gender and comorbid conditions did not have a significant effect on hospital stay.

DISCUSSION:

The mean operation duration in this study was 98.42 ± 46.25 in Group A minutes and 73.28 ± 27.81 minutes in the group B with p-value= 0.022; the mean intraoperative hospital duration in Group A was 2.47 ± 1.08 days and 2.45 ww± 1.06 days in group B with p-value = 0, the conversion rate was 9.5% in early and in the delayed group was 0%. In group A, a Bile leak was found in 11.9%patients and 2.4% of patients in group B. In a study by Khalid et al., surgery duration of 64.32 minutes and 58.24 minutes in delayed with a mean hospital duration was 1.67±0.89 days in the early group and 4.38±1.48 days in the second group with p-value=0.0001, the conversion rate was 15.5% in group A and 14.4% in the delayed group B [9]. The explanation of lengthy surgery in the early group was the time required to remove unclear and obscured clot triangles due to dense adhesions, surgical gall bladder decompression, and the long learning curve associated with surgery in acute cholecystitis. In Goh et al., study Mean operating time was 101.5 minutes as opposed to 88.0 minutes for the delayed group, and the conversion rate was 8.6 as opposed to 8.0% [10] . Kumar et al. study, the mean duration was 67.23 minutes and 40.83 minutes in the delayed group; the average postoperative hospital stay in the early group was 3.0 days, while in the delayed group, it was 2.0 days, conversion rates in the early group were10% and in delayed 14%, Intraoperative bile leakage was 8 in early group A versus 7 in delayed group B [11]. The Janjic et al. study's mean operative duration was 95.47 min and 73.7 min. The total duration of hospitalization was 2.8 and 5.6 days; in the early group, conversions were 4.8%, but in the delayed group, they were 16.7%[12]. In the Kao et al. study, the median duration of stay was 4 and 7 days, $P < 0.001$ [13]. The early group had a considerably shorter overall hospital stay than the delayed group. Along with a socioeconomic benefit, the waiting period's consequences and recurring attacks are prevented. In conclusion, we can state that the measured parameter values are consistent with international studies.

Similarly, the Chhajed study's Mean duration of hospital stay was 4.9 and 7.4 with $p = 0.001$, Mean duration of surgery was 69.3 and 108.5 minutes in a delayed group with $p = 0.001$[14]. Kohga et al. studied bile leaks at 0.3% and 3.3%, with a conversion rate of 1.3% and 10.7%[15]. There was no difference in conversion rates 3.85 and 5.10%, P=0.41in the Wang et al. study of 2020 [16]. The primary causes of conversion in our study were the Calots triangle's distortion, obscurity, and numerous thick adhesions with the surrounding structures that made dissection challenging, and in another study by Yousaf et al., bile leak was 9.5%in the early group, 9.5% and 19.5% delay group[17]. Imbisat study Gallbladder rupture affected 16% of patients in the early group and 8% of individuals in the delayed group, p=0.67Click or tap here to enter text. Bile leak occurred when the gallbladder separated from the liver) bed and from the grasping site due to friable tissue[18].

LIMITATIONS:

Several patients with acute cholecystitis subsequently diagnosed with gallbladder empyema were excluded from the study, as their inclusion may have slightly influenced the results.

CONCLUSION:

Based on the findings of this research study, it has been observed that performing laparoscopic surgery at an early stage leads to longer operating time, a higher probability of bile leakage, and a greater likelihood of conversion to open surgery than delaying laparoscopic surgery. However, the length of hospital stays is similar between the two approaches. Therefore, it is recommended that immediate surgery for patients with acute cholecystitis should be avoided, and conservative treatment should be initially pursued.

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