

Original Research Article

Outcome of Early Cholecystectomy in Patients with Acute Cholecystitis

Article History:

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Abstract:

Objective: To determine the frequency of outcome of early cholecystectomy in patients with acute cholecystitis. **Study Design:** A descriptive study. Place and Duration of Study: Department of General Surgery, Ayub Teaching Hospital, Abbottabad, Pakistan, from 6th April 2025 to 6th October 2025. **Methodology:** A total of 180 patients aged 18 to 60 years with acute cholecystitis underwent early cholecystectomy within 72 hours of admission. Data were analysed using IBM Statistical Package for the Social Sciences version 26. Categorical variables were presented as n (%), while quantitative variables were expressed as mean $\pm$ standard deviation. Chi-square test or Fisher exact test was applied and $p \leq 0.05$ was considered statistically significant. **Results:** The mean age was 40.59 ± 9.19 years and mean body mass index was 26.84 ± 2.42 kg/m². Males were 64 (35.6%) and females 116 (64.4%). Bile leak occurred in 6 (3.3%), conversion to open surgery in 16 (8.9%), wound infection in 10 (5.6%), sub hepatic collection in 5 (2.8%) and choledocholithiasis in 9 (5.0%) patients. Conversion was significantly associated with age >40 years (15.7% vs 2.2%, $p=0.001$), male gender (17.2% vs 4.3%, $p=0.006$), body mass index >25 kg/m² (11.4% vs 0.0%, $p=0.024$) and diabetes (32.0% vs 5.2%, $p<0.001$). Diabetes was also associated with wound infection and sub hepatic collection ($p=0.005$ and $p=0.020$). **Conclusion:** Early cholecystectomy showed acceptable surgical outcomes, although older age, male gender, higher body mass index and diabetes were associated with increased conversion.

Keywords: Acute cholecystitis, Cholecystectomy, Choledocholithiasis, Conversion, Surgical complications.

INTRODUCTION

Acute cholecystitis is a common disease of the gallbladder that is generally associated with cystic duct obstruction caused by gallstones.¹ Generally, the disease is characterized by right upper quadrant abdominal pain, fever, nausea, vomiting and tenderness in the right hypochondrium.² If the disease is not treated in time, the disease might cause some other complications like gangrene, perforation and collection.³ Acute cholecystitis is associated with large numbers of admissions and surgical operations; thus, diagnosis and treatment of the disease become quite significant to avoid complications.⁴

Early cholecystectomy can be described as the surgical operation on the gallbladder in the early

stages of acute cholecystitis, normally within the first few days after onset.⁵ The method most often chosen for such an operation is laparoscopic cholecystectomy due to its being a more straightforward procedure and resulting in less pain and shorter hospitalization period.⁶ As far as the operation is performed in the case of acute inflammation, it can become complicated due to the swelling, adhesions and confusion of structures in the area of the gallbladder.⁷

The outcomes of early cholecystectomy procedures can be determined by considering certain complications that might happen after the operation as well as the course of operation itself.⁸ Bile leak is one of these complications; it happens when there is

injury or incomplete closure of the cystic duct or other biliary structures.⁹ The conversion of laparoscopic to open cholecystectomy procedure might happen when there is severe inflammation, dense adhesions or unclear anatomy that makes the laparoscopic operation impossible.¹⁰ Wound infection is yet another complication that happens after the operation.¹¹

Objective

It is important to carry out the study since acute cholecystitis is common in surgery and an increasing number of early cholecystectomies are being done in order to treat it. While the procedure has its strengths, difficulties during surgery and post-operative complications might arise, especially in patients with severe inflammation or late presentation. Information regarding bile leakage, open surgery conversion and wound infections locally will be beneficial to gain insight into the results of early cholecystectomy in our setting. The study will be helpful to make improvements on surgical planning, post-operative monitoring and counseling and also minimize complications and length of stay in hospital.

METHODOLOGY

This descriptive study was conducted from 6th April 2025 to 6th October 2025 at the Department of General Surgery, ATH Abbottabad. The study included 180 patients with acute cholecystitis who underwent early cholecystectomy. The sample size was calculated by using WHO sample size software with 95% confidence level, 3% margin of error and expected frequency of choledocholithiasis of 4.4% in patients with acute cholecystitis.¹² Patients were selected through non-probability consecutive sampling technique.

Patients aged 18-60 years of both genders were included. Patients were required to have acute cholecystitis according to the stated clinical and ultrasound criteria and were undergoing early cholecystectomy, which was performed within 72 hours of admission. Patients were excluded if they had history of surgical jaundice, history of cholangitis or gallstone pancreatitis, history of gangrenous or perforated cholecystitis, previous upper abdominal surgery, pregnancy on HCG or coagulopathy. Acute cholecystitis was considered when fever was $>38^{\circ}\text{C}$, left upper quadrant abdominal pain was VAS >5 on clinical assessment and gallstones were present on ultrasound as a highly reflective echogenic focus within the gallbladder lumen.

After permission from the ethical committee and CPSP, informed consent was obtained from all patients before data collection. Patients were informed regarding the study, confidentiality of their information and that participation was not expected to produce additional risk. Baseline demographic information was age, gender, BMI, profession,

duration of complaints, socioeconomic status, education level, diabetes and residential status.

A detailed history was taken regarding presenting complaints, duration of complaints and relevant previous medical and surgical history. Clinical examination was performed with assessment of temperature, abdominal tenderness and other relevant findings. Patients were then prepared for laparoscopic cholecystectomy under general anaesthesia with endotracheal intubation. Pneumoperitoneum was created by blind puncture using a Veress needle through a subumbilical incision. Four laparoscopic ports were used, including a 10-mm umbilical port for the 0-degree optical instrument, a 10-mm subxiphoid port for working instruments, a 5-mm right subcostal port along the midclavicular line for working instruments and a 5-mm right flank port for retraction. Adhesions were released and the Calot triangle was exposed first. When required, the gallbladder was emptied through a laterally inserted Veress needle for better grasping. The cystic pedicle was identified and the cystic duct and cystic artery were isolated separately, clipped and divided. The gallbladder was dissected from its bed using a monopolar cautery hook. At the end of surgery, the gallbladder was placed in a retrieval bag and removed through the subxiphoid incision, which was enlarged when required. Hemostasis was achieved in the gallbladder bed followed by saline lavage and a suction drain was placed when clinically indicated. The incisions were then closed. The procedures were performed by competent trainees under supervision of a consultant. Patients were followed for at least 30 days after discharge and intraoperative and postoperative findings were recorded.

The outcome was assessed in terms of bile leak, conversion rate, wound infection, sub hepatic collection and choledocholithiasis. Bile leak was considered when yellow-green fluid was observed in the surgical area with surrounding tissues appearing inflamed or irritated during surgery. Conversion rate was considered when laparoscopic surgery was converted to open surgery through a right subcostal incision because of distorted or unclear Calot triangle, multiple dense adhesions around the Calot triangle or adhesions with surrounding structures, with any one of these findings being sufficient. Wound infection was considered when erythema extending >1 cm from the wound margin, tenderness on palpation and sero-sanguinous and/or purulent discharge were found on physical examination at any time up to 1 month after the procedure. Sub hepatic collection was considered when ultrasound showed anechoic or hypoechoic fluid collection beneath the liver with diameter >2 cm and estimated volume >100 mL, consisting of bile, blood or serous fluid. Choledocholithiasis was considered when ultrasound showed an echogenic rounded focus measuring 2 to

>20 mm within the bile duct.

Data was analysed using IBM SPSS version 26. Categorical variables including gender, socioeconomic status, education level, residential status, profession, diabetes, bile leak, conversion rate, wound infection, sub hepatic collection and choledocholithiasis were presented as frequencies

and percentages. Quantitative variables including age, BMI and duration of complaints were presented as mean $\pm$ standard deviation. The outcome was stratified according to age, gender, BMI and diabetes. Chi-square test or Fisher exact test was applied after stratification and $p \leq 0.05$ was considered statistically significant.

RESULTS

The study enrolled 180 patients with a mean age of 40.59 ± 9.19 years, mean BMI of 26.84 ± 2.42 Kg/m² and mean duration of complaints of 6.62 ± 5.63 hours. Majority of patients were jobless 90 (50.0%), followed by job holders 66 (36.7%) and those in business 24 (13.3%). Regarding socioeconomic status, middle class was most common 79 (43.9%), followed by poor 73 (40.6%) and rich 28 (15.6%). Most patients were from rural areas 109 (60.6%) and had no diabetes 155 (86.1%) (Table 1).

Table 1. Patient Demographics. n=151

Demographics	Mean $\pm$ SD
Age (years)	40.59 $\pm$ 9.19
BMI (Kg/m ²)	26.84 $\pm$ 2.42
Duration of Complaints (hours)	6.62 $\pm$ 5.63
Profession	
Jobless n (%)	90 (50.0%)
Job n (%)	66 (36.7%)
Business n (%)	24 (13.3%)
Socioeconomic Status	
Poor n (%)	73 (40.6%)
Middle n (%)	79 (43.9%)
Rich n (%)	28 (15.6%)
Education Level	
Uneducated n (%)	64 (35.6%)
Primary n (%)	52 (28.9%)
Secondary n (%)	49 (27.2%)
Higher n (%)	15 (8.3%)
Residential Status	
Rural n (%)	109 (60.6%)
Urban n (%)	71 (39.4%)
Diabetes	
Yes n (%)	25 (13.9%)
No n (%)	155 (86.1%)

Regarding surgical outcomes, bile leak was observed in 6 (3.3%) patients, conversion rate was recorded in 16 (8.9%) cases, wound infection was noted in 10 (5.6%) patients, sub hepatic collection was seen in 5 (2.8%) cases and choledocholithiasis was found in 9 (5.0%) patients (Table 2).

Table 2. Frequency of Outcomes Among Patients Undergoing Early Cholecystectomy for Acute Cholecystitis. n=180

Outcome	Frequency	%age
Bile Leak	6	3.30%
Conversion Rate	16	8.90%
Wound Infection	10	5.60%
Sub Hepatic Collection	5	2.80%
Choledocholithiasis	9	5.00%

On stratified analysis, conversion rate was significantly higher in patients aged >40 years 14 (15.7%) versus ≤ 40 years 2 (2.2%), $p=0.001$ and in males 11 (17.2%) versus females 5 (4.3%), $p=0.006$. It was also significantly higher in patients with BMI >25 Kg/m² 16 (11.4%) compared to 0 (0.0%) with BMI ≤ 25 , $p=0.024$. Diabetes was significantly associated with conversion rate, with 8 (32.0%) diabetic patients having conversion versus 8 (5.2%) non-diabetic patients, $p<0.001$. Wound infection was also higher in diabetic patients 5 (20.0%) versus non-diabetic patients 5 (3.2%), $p=0.005$, while sub hepatic collection occurred in 3 (12.0%) diabetic versus 2 (1.3%) non-diabetic patients,

p=0.020. All other associations, including bile leak with age, gender, BMI and diabetes and choledocholithiasis and wound infection with age, gender and BMI, were statistically non-significant (Table 3).

Table 3. Association of Surgical Outcomes with Demographic Factors. n=180

Demographic Factors	Sub Groups	Bile Leak		Conversion Rate		Wound Infection		Sub Hepatic Collection		Choledocholithiasis	
		Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)
Age (years)	≤40	2 (2.2%)	89 (97.8%)	2 (2.2%)	89 (97.8%)	8 (8.8%)	83 (91.2%)	1 (1.1%)	90 (98.9%)	2 (2.2%)	89 (97.8%)
	>40	4 (4.5%)	85 (95.5%)	14 (15.7%)	75 (84.3%)	2 (2.2%)	87 (97.8%)	4 (4.5%)	85 (95.5%)	7 (7.9%)	82 (92.1%)
	p-value	0.441**		0.001**		0.100**		0.208**		0.098**	
Gender	Male	3 (4.7%)	61 (95.3%)	11 (17.2%)	53 (82.8%)	4 (6.3%)	60 (93.8%)	0 (0.0%)	64 (100.0%)	1 (1.6%)	63 (98.4%)
	Female	3 (2.6%)	113 (97.4%)	5 (4.3%)	111 (95.7%)	6 (5.2%)	110 (94.8%)	5 (4.3%)	111 (95.7%)	8 (6.9%)	108 (93.1%)
	p-value	0.668**		0.006**		1.000**		0.162**		0.161**	
BMI group (Kg/m ²)	≤25	1 (2.5%)	39 (97.5%)	0 (0.0%)	40 (100.0%)	0 (0.0%)	40 (100.0%)	0 (0.0%)	40 (100.0%)	3 (7.5%)	37 (92.5%)
	>25	5 (3.6%)	135 (96.4%)	16 (11.4%)	124 (88.6%)	10 (7.1%)	130 (92.9%)	5 (3.6%)	135 (96.4%)	6 (4.3%)	134 (95.7%)
	p-value	1.000**		0.024**		0.120**		0.354*		0.686**	
Diabetes	Yes	2 (8.0%)	23 (92.0%)	8 (32.0%)	17 (68.0%)	5 (20.0%)	20 (80.0%)	3 (12.0%)	22 (88.0%)	3 (12.0%)	22 (88.0%)
	No	4 (2.6%)	151 (97.4%)	8 (5.2%)	147 (94.8%)	5 (3.2%)	150 (96.8%)	2 (1.3%)	153 (98.7%)	6 (3.9%)	149 (96.1%)
	p-value	0.196**		<0.001*		0.005**		0.020**		0.113**	

*Chi-Square Test, **Fisher Exact Test

DISCUSSION

The present study included 180 patients with mean age of 40.59 ± 9.19 years and mean BMI of 26.84 ± 2.42 Kg/m². Bile leak was observed in 6 (3.3%), conversion rate in 16 (8.9%), wound infection in 10 (5.6%), sub hepatic collection in 5 (2.8%) and choledocholithiasis in 9 (5.0%) patients. On stratified analysis, conversion rate, wound infection and sub hepatic collection were significantly associated with diabetes, whilst conversion rate was also significantly associated with age >40 years, male gender and BMI >25 Kg/m².

Regarding conversion rate of 8.9% in present study, this was higher than Qureshi et al. 13 who reported 2.9% in patients operated within 72 hours and Abeyasuriya et al. 14 who reported 3.6%. Siddiqui et al. 15 and Saeed et al. 16 reported conversion rates of 1.8% and negligible respectively, while Ahmad et al. 17 reported no conversion in the early group. Afzal et al. 18 reported 3.2%, Waqar et al. 19 2.1% and Memon et al. 20 3.62%, all lower than present

findings. Qaiser et al. 21 also reported only 2.4%. The higher conversion rate may be related to older age and greater diabetic comorbidity in present study, as both were significantly associated with conversion. Afzal et al. 18 and Waqar et al. 19 similarly noted that comorbidities and dense adhesions contributed to conversion. Qaiser et al. 21 attributed conversions to adhesions and intraoperative inflammation, comparable to present findings where BMI >25 and older age were significant risk factors.

Bile leak occurred in 6 (3.3%) patients in present study. This was comparable to Qureshi et al. 13 who reported bile leak in 1.9% of early and 6.8% of delayed cases. Waqar et al. 19 reported biliary leak in 2.8%, while Memon et al. 20 reported biliary injury in 1.44%. Saeed et al. 16 reported only 1 (0.6%) bile leak, whereas Abeyasuriya et al. 14 reported no bile fistula or biliary injury. The slightly higher rate in present study may be related to higher BMI and diabetic comorbidity. However, bile leak showed no significant association with age, gender, diabetes or BMI.

Wound infection occurred in 10 (5.6%) patients and was significantly associated with diabetes ($p=0.005$), with 5 (20.0%) diabetic compared with 5 (3.2%) non-diabetic patients. This was comparable to Waqar et al. 19 who reported port-site infection in 6.3%, while Memon et al. 20 reported 2.17%. Afzal et al. 18 also reported port-site infection as a postoperative complication. Siddiqui et al. 15 reported only 1 (0.9%) urinary tract infection and no wound infection. Differences may reflect variation in patient selection, age, comorbidity and perioperative antibiotic protocols.

Subhepatic collection occurred in 5 (2.8%) patients and was significantly associated with diabetes ($p=0.020$), affecting 3 (12.0%) diabetic versus 2 (1.3%) non-diabetic patients. Qureshi et al. 13 reported residual collection in 1.0% of the early group and 6.8% of the delayed group, while Afzal et al. 18 reported subphrenic collection in 0.64%. The higher rate in present study may be related to the greater diabetic burden, as impaired immune response may predispose to collection formation. Choledocholithiasis occurred in 9 (5.0%) patients, compared with 1.2% reported by Qaiser et al. 21 Saeed et al. 16 also reported CBD stones requiring ERCP and exploration, supporting the present findings. No significant association was found between choledocholithiasis and demographic factors in present study.

Limitations

There are certain limitations in the current study that need to be kept in mind while interpreting the findings. This was a single center study and hence, the generalizability of findings cannot be assumed to the larger population. The number of patients recruited for this study was relatively less and hence, might have led to the lack of statistical significance in some analyses. The data on surgical duration, duration of stay at the hospital and the long-term outcome of the patients was not taken into consideration in this study.

CONCLUSION

This study has concluded that early cholecystectomy in patients suffering from acute cholecystitis has been linked to satisfactory results with respect to bile leak, wound infection, sub hepatic collection and choledocholithiasis. It was found that diabetes was a significant risk factor for post-operative complications, which include conversion rate, wound infection and sub hepatic collection. In addition, increased age and higher BMI were found to be significantly related to the conversion rate.

Ethical Approval

The research was conducted after obtaining approval from the Institutional Ethical Committee of the

hospital. Ethical clearance was received before starting the study procedures.

Patients' Consent

All participants were informed about the study and written informed consent was taken before their inclusion.

Competing Interests

The author declared that there was no conflict of interest associated with this research.

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