

Outcome of Early Versus Delayed Laparoscopic Cholecystectomy in Acute Calculus Cholecystitis

Shahed Mohammed Anwar^{1*} Md Matiar Rahaman Khan² Mohammad Moinul Hasan³
Hussain Ahammed Khan³ Shoibul Karim¹ Mohammad Sazzad Hossain⁴ Rokhsana Afrose⁵

ABSTRACT

Background: The timing of cholecystectomy for acute cholecystitis has been debated with most studies favoring early cholecystectomy. However, most surgeons in Bangladesh prefer to delay surgery in the acute phase. The study aimed to compare between early Laparoscopic Cholecystectomy (LC) with that of delayed laparoscopic cholecystectomy in the management of acute calculus cholecystitis.

Materials and methods: This quasi-experimental study included a total of 74 patients with a diagnosis of acute calculous cholecystitis as per Tokyo guideline from the Surgery Department, Chittagong Medical College Hospital, during August 2019 to July 2020. Thirty-seven patients underwent early cholecystectomy (Within 7 days of onset of symptoms) and 37 patients underwent elective or delayed cholecystectomy (After a gap of 6-8 weeks from the acute attack). Peroperative events, postoperative complications, length of hospital stay and days needed to return to full activity were compared between two groups.

Results: Both early and delayed groups were similar in-terms of their baseline demographic and clinical characteristics. Significantly higher number of patients in the early group had difficult Callot's triangle dissection (59.4% vs. 27.1%, $p < 0.01$) and lower number of patients had difficult gallbladder bed dissection (5.4% vs. 37.8%, $p < 0.001$) than the delayed group. The proportion of the patients required conversion to open surgery was 10.8% and 6.1%, respectively in early and delayed group ($p = 0.691$). Total hospital stay was shorter in the early surgery group than the delayed surgery group (6.05 ± 0.52 vs. 12.03 ± 1.46 days, $p = 0.001$). Wound infection, duration of hospital stays following surgery, and days need to return to full activity after surgery was similar between two groups.

Conclusion: Early cholecystectomy is feasible and safe for acute cholecystitis and is better method of treatment because of its shorter hospital stay, which is a major economic benefit to both the patient and health care system.

Key words: Acute cholecystitis; Delayed laparoscopic cholecystectomy; Early laparoscopic cholecystectomy.

Introduction

Cholecystectomy is one of the most commonly performed procedures and Laparoscopic Cholecystectomy (LC) is one of the most commonly undertaken procedures in General Surgery.¹ Since its introduction in the 1980s, laparoscopic cholecystectomy

is now the standard of care due to its advantages of reduced cost and length of hospital stay, and increased patient satisfaction.² Although it is considered a safe procedure, morbidity occurs in approximately 5–7% of the patients, which includes bleeding, abscess, bowel/vascular injury, wound complications, and bile duct injury including bile leaks.^{2,3} As some of these complications can lead to devastating outcomes, performing safe cholecystectomy is crucial.

The timing of cholecystectomy has been an area of controversy with most studies favoring early cholecystectomy over delayed due to overall better quality of life, lower morbidity rates and lower hospital cost.⁴ The rationale for performing early cholecystectomy within seven days of symptoms is due to pathological observation that past that time period, inflammatory changes become more vascular and fibrotic which may lead to a more difficult dissection and greater potential for conversion to open operation or injuring to bile duct. In classical teaching after onset of symptoms, there is an early period in which inflammatory changes are favorable for cholecystectomy for acute cholecystitis, an intermediate

1. Assistant Professor of Surgery
Chattagram Maa-O-Shishu Hospital Medical College, Chattogram.
2. Professor of Surgery
Chittagong Medical College, Chattogram.
3. Registrar of Surgery
Chittagong Medical College Hospital, Chattogram.
4. Assistant Registrar of Thoracic Surgery
Chittagong Medical College Hospital, Chattogram.
5. Consultant of Paediatrics
National Hospital Chattogram, Chattogram.

*Correspondence : **Dr Shahed Mohammed Anwar**
Cell : +88 0181931 37 50
Email : shahed4anwar@gmail.com

Date of Submission : 20th October 2022
Date of Acceptance : 15th November 2022

period in which conditions are less favorable, and a late period, during which it is again favorable to perform cholecystectomy.⁴⁻⁶

However, majority of surgeons still prefer to manage acute cholecystitis by conservative management with intravenous fluids and analgesia, usually in conjunction with antibiotics. Elective cholecystectomy is carried out after a period of 4 to 6 weeks when acute attack has settled down. Since most surgeons prefer to delay surgery during the acute phase, this study was conducted with an intention to study the results of early surgery compared with delayed surgery and find optimum treatment for acute cholecystitis.

Materials and methods

A quasi-experimental study was conducted in the department of Surgery, Chittagong Medical College Hospital from August 2019 to July 2020 including the patients underwent laparoscopic cholecystectomy. All patients gave written informed consent. The Ethical Review Committee of Chittagong Medical College approved the study protocol.

Patients aged 18 years and above admitted with a diagnosis of acute calculus cholecystitis as per Tokyo guideline were included in the study. Patients with acalculous cholecystitis, chronic cholecystitis, previous history of upper abdominal surgery, co-morbid conditions, age more than 60 years were excluded.

A total of 74 patients were enrolled in the study and were divided into two groups. Thirty-seven patients were selected for early cholecystectomy (Within 7 days of onset of symptoms) and 37 patients for elective cholecystectomy (After a gap of 6-8 weeks from the acute attack). Preference of the patient regarding the option of early or elective surgery and open or laparoscopic surgery was also taken into consideration. LC was done by standard 4 port technique, two 10mm ports, one in the umbilical and another in the epigastric region and two 5mm ports in the subcostal in the right upper quadrant and another placed lower near the right anterior axillary line. Gall Bladder was brought out through the umbilical port. Patients in the delayed group was treated with intravenous fluids, antibiotics and analgesics. Patients who responded to conservative treatment were discharged after a complete relief of symptoms. They were called for laparoscopic cholecystectomy after 6 weeks, when the acute episode had subsided.

Patients were discharged on 2nd post-operative day and was followed up postoperatively at least for one month. Main outcome variables were intraoperative complications, postoperative complications, duration of hospital stay and days needed to return full activity following surgery. For the delayed operation group,

hospitalization days first for initial conservative treatment and then for operation added together and considered as total length of stay.

Data were analyzed using Statistical Packages for Social Sciences (SPSS-23, IBM). Quantitative variables were presented as means standard deviations and tested by the Student t-test. Frequencies and percentages indicated the quantitative observation, and Chi-Square (or Fisher's exact test) test was done and showed with cross-tabulation. $p < 0.05$ was considered as statistically significant difference.

Results

Demographic characteristics were similar in two groups at baseline (Table I). The overall mean age was around 40 years in the present study and there was female preponderance.

Table I Distribution of the study patients by demographic profile (n=74)

Demographic profile	Early group (n=37)		Delayed group (n=37)		p Value
	n	%	n	%	
Age, Years					
Mean±SD	40.38±12.74		39.97±12.21		^a 0.888
Sex					
Male	11	29.7	7	18.9	^b 0.278
Female	26	70.3	30	81.1	

^aUnpaired t-test, ^bChi-square test.

Different intraoperative and postoperative events are compared between two groups in Table II. It depicted that; the groups were different in terms of difficult Callot's triangle dissection and Gallbladder bed dissection, and intraoperative bleeding. Significantly higher proportion of patients in the early had difficult Callot's triangle dissection and intraoperative bleeding than the delayed group. On the other hand, opposite trend was observed for difficult Gallbladder bed dissection. Port/wound site infection was the only complications observed in the postoperative period without any statistical difference between two groups.

Table II Distribution of the study patients by intraoperative findings

Intraoperative and postoperative findings	Early group (n=37)		Delayed group (n=37)		p value ^b
	n	%	n	%	
Pericholecystic adhesion	20	54.1	13	35.1	0.161
Difficult Callot's triangle dissection	22	59.4	10	27.1	0.010
Difficult Gallbladder bed dissection	2	5.4	14	37.8	0.001
Thick Gall Bladder Wall	9	24.3	10	27.0	0.790
Intraoperative bleeding	13	35.1	4	10.8	0.027
Conversion to open cholecystectomy	4	10.8	3	8.1	0.691
Port / wound infection	3	8.1	2	5.4	0.643

^bChi-square test. Significant values were in bold face.

The mean total duration of hospital stay was significantly shorter in the early group than the delayed group (6.05±0.52 vs. 12.03±1.46 days, $p<0.001$). However, the mean total duration of postoperative days in the hospital was similar in both groups ($p<0.744$), and most of the patients in both groups were discharged on 2nd postoperative days. The mean days needed to return to full activity after surgery was 6.57±1.83 days in early group and 7.89±2.85 days in the delayed group, and the difference was statistically significant ($p<0.02$).

Table III Comparison of duration of hospital stay and days needed to return to full activity after surgery between two groups

Variables	Early group (n=37)	Delayed group (n=37)	p value
Total duration of hospital stays, days	6.05±0.52	12.03±1.46	^a 0.001
Postoperative days in hospital, days			
Two days	31 (83.8)	32 (86.5)	^b 0.744
>Two days	6 (16.2)	5 (13.5)	
Days needed to return to full activity after surgery, days	6.57±1.83	7.89±2.85	^a 0.020

Data were expressed as mean±SD or frequency (%). Fisher's exact test. ^aUnpaired t-test, ^bFisher's exact test. Significant values were in bold face.

Discussion

Modern trend is towards an increased rate of early laparoscopic cholecystectomy for acute cholecystitis. However, there is a large variation in what is considered early versus late.⁶ In the present study early cholecystectomy was done within 7 days of the symptom onset and delayed cholecystectomy was done after an interval of 6-8 weeks. Both the groups of the present study were similar in terms of baseline demographic and clinical characteristics. The study demonstrated that though both early and delayed cholecystectomy have similar safety profile, early surgery was superior due to its less total time to stay in hospital.

Significantly higher proportion of patients in the early group had difficult Calot's triangle dissection and intraoperative bleeding than the delayed group. On the other hand, opposite trend was observed for difficult Gallbladder bed dissection. Madhu et al. reported that surgical intraoperative complications like adhesions, bleeding etc. are lower in early group compared to delayed group where there was more adhesions and intraoperative bleeding.⁷ Mahapatra et al. found that the main reasons for conversion in the early cases were difficult anatomy of Calot's triangle and haemorrhage, while in the delayed group it was haemorrhage.⁸ For good exposure of Calot's triangle, decompression of the

gallbladder should be done early as this allows better grasping and retraction of the gallbladder.^{8,9}

In this present study, it was observed that conversion to open cholecystectomy was 10.8% and 8.1%, respectively in the early and delayed group. The difference was not significant statistically between groups. The conversion rates in the early groups ranged between 0% to 11% and in the delayed group it was higher (16.7% to 20%).⁷⁻¹³

Wound infection, biliary leakage, upper respiratory tract infection, prolonged ileus and fever are the main postoperative complication associated with both early and elective cholecystectomy in acute cholecystitis. Bile duct injury as an intra-operative complication is of major concern in both the groups.⁶ Other than port site infections, no other complications were observed in the present study. The port site infections rates were similar in both groups (8.1% and 5.4%, respectively in the early and delayed group, $p<0.643$).

The studies were consistent regarding the higher days of hospital stays in the delayed group than the early group.^{6-8,11} Present study confirmed this as the mean total duration of hospital stay was significantly shorter in the early group than the delayed group (6.05±0.52 vs. 12.03±1.46 days, $p<0.001$). However, the mean total duration of postoperative days in the hospital was similar in both groups ($p<0.744$), and most of the patients in both groups were discharged on 2nd postoperative days, which agreed to the other studies.⁷⁻¹⁰ The mean days needed to return to full activity after surgery was 6.57±1.83 days in early group and 7.89±2.85 days in the delayed group, and the difference was statistically significant ($p<0.02$). The findings were similar to other studies.⁶

Limitations

The study population was selected from one selected hospital in Chittagong city, so that the results of the study may not be reflect the exact picture of the country. Small sample size was also a limitation of the present study. Failure to do a true randomized allocation was another limitation.

Conclusion

Patients in the early group had shorter days of hospital stay, mean days of return to full activities were less and no difference in conversion to open cholecystectomy rate as compared to delayed laparoscopic surgery group in acute cholecystitis. Other than port site infection, post operative complications were not found in any group. Early laparoscopic cholecystectomy was more effective than delayed laparoscopic cholecystectomy in reducing the cost of treatment, usage of antimicrobials, duration of hospital stays, early return to full activity and reducing patients period of suffering.

Recommendation

These results support that early laparoscopic cholecystectomy is the preferred care and should be considered a routine in patients presenting with acute cholecystitis. Further multicenter, randomized controlled trial is needed to validate our findings.

Disclosure

All the authors declared no competing interests.

References

1. Osborne DA, Alexander G, Boe B, Zervos EE. Laparoscopic cholecystectomy: Past, present and future. *Surgical technology international*. 2006; 15:81-85.
2. McIntyre C, Johnston A, Foley D, Lawler J, Bucholtz M, Flanagan L et al. Readmission to hospital following laparoscopic cholecystectomy: A meta-analysis. *Anaesthesiology Intensive Therapy*. 2020;52(1):47-55.
3. Murphy MM, Ng SC, Simons JP, Csikesz NG, Shah SA, Tseng JF. Predictors of major complications after laparoscopic cholecystectomy: Surgeon, hospital or patient? *Journal of the American College of Surgeons*. 2010;211(1):73-80.
4. Thangavelu A, Rosenbaum S, Thangavelu D. Timing of cholecystectomy in acute cholecystitis. *The Journal of emergency medicine*. 2018;54(6):892-897.
5. Hadad SM, Vaidya JS, Baker L, Koh HC, Heron TP, Thompson AM. Delay from symptom onset increases the conversion rate in laparoscopic cholecystectomy for acute cholecystitis. *World journal of surgery*. 2007;31(6):1300-1303.
6. Cao AM, Eslick GD, Cox MR. Early cholecystectomy is superior to delayed cholecystectomy for acute cholecystitis: A meta-analysis. *Journal of Gastrointestinal Surgery*. 2015;19(5):848-857.
7. Madhu CP, RM SK. Compare the effectiveness of early versus delayed laparoscopic cholecystectomy in acute calculus cholecystitis. *International Surgery Journal*. 2018;5(2):695-700.
8. Mahapatra B, Deolekar SR, Subudhi S. Early laparoscopic cholecystectomy in acute cholecystitis: Preferable option. *International Journal of Surgery*. 2019;3(4):345-348.
9. Arafa AS, Khairy MM, Amin MF. Emergency versus delayed laparoscopic cholecystectomy for acute cholecystitis. *The Egyptian Journal of Surgery*. 2019;38(2):171-179.
10. Chhajer R, Dumbre R, Fernandes A, Phalgune D. Early versus delayed laparoscopic cholecystectomy for acute cholecystitis: A comparative study. *International Surgery Journal*. 2018;5(10):3381-3385.
11. Janjic G, Simatovic M, Skrbic V, Karabeg R, Radulj D. Early vs. Delayed Laparoscopic Cholecystectomy for Acute Cholecystitis-Single Center Experience. *Medical Archives*. 2020;74(1):34-39.
12. Verma S, Agarwal PN, Bali RS, Singh R, Talwar N. Early versus delayed laparoscopic cholecystectomy for acute cholecystitis: A prospective randomized trial. *International Scholarly Research Notices*. 2013;2013.
13. Kolla SB, Aggarwal S, Kumar A, Kumar R, Chumber S, Parshad R, Seenu V. Early versus delayed laparoscopic cholecystectomy for acute cholecystitis: A prospective randomized trial. *Surgical Endoscopy and Other Interventional Techniques*. 2004;18(9):1323-1327.