Comparison of Early Versus Delayed Laparoscopic Cholecystectomy in Patients with Acute Calculus Cholecystitis: A Single-Centre Cross-Sectional Study

Suravi Podder[1], Dewan Ali Hassan Chowdhury[2], Md. Golam Mowla[3], Sayeda Ishtar Islam[4], Mohammad Nurunnabi[5]

1. Assistant Professor
   Department of General Surgery
   Sylhet Women's Medical College
2. Professor and Head
   Department of General Surgery
   Sylhet Women's Medical College
3. Professor
   Department of General Surgery
   Sylhet Women's Medical College
4. Assistant Professor
   Department of General Surgery
   Sylhet Women's Medical College
5. Assistant Professor
   Department of Community Medicine and Public Health
   Sylhet Women's Medical College

Correspondence to:
Mohammad Nurunnabi
Assistant Professor
Department of Community Medicine and Public Health
Sylhet Women's Medical College
Sylhet, Bangladesh
E-mail: nur.somch@gmail.com

Submission Date : 08 May 2025
Accepted Date : 26/06/2025
Published Date : 30 September 2025
DOI: https://doi.org/10.3329/jrpmc.v10i2.85672

Abstract

Introduction:
Acute calculus cholecystitis is a frequent cause of biliary morbidity, and laparoscopic cholecystectomy is the preferred treatment. Early surgery may limit inflammation and reduce pain duration, while delayed surgery allows resolution of acute symptoms. Comparing outcomes of early versus delayed intervention is essential to guide optimal surgical timing and improve patient recovery.

Objective:
To compare the outcomes of early versus delayed laparoscopic cholecystectomy in patients with acute calculus cholecystitis.

Methods:
Acomparative cross-sectional study was conducted at the Department of Surgery, Sylhet Women's Medical College Hospital from January 2023 to December 2024. A total of 86 patients were divided into two groups: early surgery (within 72 hours of symptom onset) and delayed surgery (after 72 hours, following 4-6 weeks of conservative management). Outcomes assessed included duration of surgery, complications, conversion to open surgery, hospital stay, post-operative pain, time to return to normal activities, and port site infection.

Results:
Early surgery was associated with shorter duration of abdominal pain (3.05 vs. 4.15 days, $p<0.001$), higher WBC count ($p=0.003$), and elevated bilirubin ($p<0.001$), reflecting more acute presentation. Operation time, postoperative pain, and return to normal activities were similar. Nausea, vomiting, and positive Murphy's sign were more frequent in the early group ($p<0.05$). No differences were observed in complications, conversion to open surgery, or port-site infection, indicating comparable safety for both approaches.

Conclusion:
Early laparoscopic cholecystectomy effectively reduces pain duration and addresses acute inflammation without increasing complications, making it a safe and preferable approach for acute calculus cholecystitis.

Keywords: Acute calculus cholecystitis, Early, Delayed laparoscopic cholecystectomy, Outcomes

Citation: Podder S, Chowdhury DAH, Mowla G, Islam SI, Nurunnabi M.Comparison of Early Versus Delayed Laparoscopic Cholecystectomy in Patients with Acute Calculus Cholecystitis: A Single-Centre Cross-Sectional Study. J Rang Med Col. 2025 Sep;10(2):135-140. doi: https://doi.org/10.3329/jrpmc.v10i2.85672

Introduction:

Cholelithiasis is one of the most common surgical diseases in our country nowadays. In 2019 prevalence of gall stones in Northern India is 6.12%.[1] About 1-15% of adult western population has gall stones.[2] In USA, prevalence of cholithiasis is same as in western world but it appears somewhat lower in Asia and Africa.[3] It is three times more common in women than men.[4] Gallstone presentation is variable. Asymptomatic gallstones usually do not need any intervention. Symptomatic gallstone disease may lead to biliary colic, acute cholecystitis with progression to empyema and perforation, chronic cholecystitis and life threatening complications like obstructive jaundice, pancreatitis and intestinal obstruction.A variety of treatments have been offered from time to time for gall bladder diseases. Cholecystectomy

has become one of the best and most accepted treatment modalities for gall bladder diseases, every year, about 500,000 people all over the world have their gall bladders removed.[5] Till date laparoscopic cholecystectomy is considered the 'gold standard' in the treatment of cholelithiasis or cholecystitis and highlights all the advantages of laparoscopy as minimally invasive surgical aid.[6] The timing of surgery in acute cholecystitis remains controversial. Acute Cholecystitis was traditionally treated with antibiotics and supportive treatment (bowel rest, intravenous hydration, analgesia, correction of electrolyte imbalance and intravenous antibiotics) and cholecystectomy was performed after 6 weeks of the acute episode.[7,8] Laparoscopic cholecystectomy is avoided for acute cholecystitis due to concerns about the potential hazards of complications and a high conversion rate to open cholecystectomy. Inflammatory tissue reaction makes dissection difficult and increase the risk of bile duct injury due to distorted anatomy caused by the acute infiammation.[9] In the acute onset of cholecystitis initially laparoscopic cholecystectomy used in selected cases, but with advances in instrumentation, better visualization because of new generation cameras and optics, increasing knowledge about the anatomy of the hepato-billiary tree and the surrounding structures and improved surgical skills, surgeons started performing laparoscopic cholecystectomy even in acute cholecystitis, which was initially considered a relative contraindication. Some studies have shown that when acute inflammation matures to chronic inflammation, there is neovascularity, fibrosis and contraction which make laparoscopic cholecystectomy more difficult and potentially more dangerous.[4] So, there is an increased risk of gall stone related morbidity during the waiting period for cholecystectomy. The sequence of these inflammatory changes has led to the belief of performing surgery for acute cholecystitis during first 'golden 72 hours' of the onset of symptoms.[10] Early laparoscopic cholecystectomy also cost effective for the patient. Laparoscopic cholecystectomy is now the procedure of choice for patient presenting with acute cholecystitis unless it is contraindicated for technical reason or safety.[5]

The aim of this study is to compare outcome of patients undergoing early laparoscopic cholecystectomy within 72 hours of symptoms to those of patients managed conservatively and operated late after 6-8 weeks after the inflammatory reaction has subsided.

Methods:

This comparative cross-sectional study was conducted to compare the outcomes of early versus delayed laparoscopic cholecystectomy in in-patients with acute calculus cholecystitis in the Department of Surgery, Sylhet Women's Medical College Hospital, Sylhet, from January 2023 to December 2024. A total of 86 patients with acute calculus cholecystitis were enrolled and divided into two groups. Group A included patients admitted within 72 hours of symptom onset who underwent early laparoscopic cholecystectomy, while patients presenting after 72 hours received delayed surgery 4–6 weeks following conservative management. Outcomes assessed were duration of surgery, complications, conversion to open surgery, hospital stay, post-operative pain, time to return to normal activities, and port site infection.

The study included symptomatic gallstone patients presenting either within 72 hours of pain onset or after 72 hours. Patients with obstructive jaundice, pancreatitis, a history of previous upper abdominal surgery, or significant comorbidities classified as ASA Class greater than III were excluded from the study.

Data were entered and analyzed using IBM SPSS Version 26 (New York, USA). Descriptive statistics were presented as frequencies (percentages) for categorical data and means (±SD) for continuous data. The Chi-square ($\chi 2$) test, Fisher exact test and independent sample t-test were used to assess associations. A p-value <0.05 at a 95% confidence interval was considered statistically significant.

Participants were informed about the objectives and procedures of the study, as well as the confidentiality of the information they provided. Informed consent was obtained from all participants prior to data collection. The study protocol was approved by the Institutional Review Board of Sylhet Women's Medical College [Reference: SWMC/Eth.C/IERB/202401 (A)], and all procedures adhered to the Declaration of Helsinki (2013 revision).

Results:

There was no statistically significant difference in the mean age between early (38.49±12.84 years)

and delayed (42.51±14.29 years) groups (p=0.372). The average hospital stay was similar in both groups, with no significant difference (p=0.391). Although the duration of abdominal pain was longer in the delayed group (4.15±6.57 days) compared to the early group (3.05±1.54 days), the difference was statistically highly significant (p=0.000), indicating delayed surgery was associated with a longer pain duration. There was no significant difference in hemoglobin levels between the groups (p=0.470). Patients in the early surgery group had a significantly higher white blood cell count (10.95±3.56) compared to those in the delayed group (8.56±2.04), and the difference was statistically significant (p=0.003), possibly reflecting more acute inflammation in the early group. The neutrophil percentage was higher in the early group (77.66±8.86 vs. 59.33±11.40), the difference was not statistically significant (p=0.281). The early group showed significantly higher serum bilirubin levels (0.77±0.73) compared to the delayed group (0.44±0.21) with a significant difference (p=0.000), signifying more pronounced biliary involvement in early cases. While SGPT was higher in the early group, the difference was not statistically significant (p=0.080). No significant difference was observed in ALP levels between the two groups (p=0.177). The mean operation time was slightly longer in the early group, but the difference was not statistically significant (p=0.506). Though the early group had higher pain scores (3.53±0.86) than the delayed group (2.77±0.72), the difference was not statistically significant (p=0.286). Both groups had the same follow-up schedule (10 days), with no variation. Patients in the delayed group returned to normal activities slightly earlier (5.33±1.21 days vs. 5.91±1.31 days), but the difference was not statistically significant (p=0.643) (Table-I). Independent sample t-test done, p<0.05

Table-I: Comparison of the patients clinical, and laboratory parameters between early and delayed laparoscopic cholecystectomy (N=86)

Variables	Laparoscopic Cholecystectomy		t-value	p-value
	Early	Delayed		
Age of the patients (in years)	38.49±12.84	42.51±14.29	-1.373	0.372
Hospital stay (in days)	4.44±1.47	4.51±1.78	-0.198	0.391
Clinical features (Duration of abdominal pain)	3.05±1.542	4.15±6.57	-1.070	0.000
Investigation findings				
Hb%	12.02±1.38	11.57±1.03	1.713	0.470
WBC count	10.95±3.56	8.56±2.04	3.815	0.003
Neutrophil	77.66±8.86	59.33±11.40	8.323	0.281
Serum bilirubin	0.77±0.73	0.44±0.21	2.757	0.000
SGPT	58.91±69.94	35.95±53.19	1.713	0.080
ALP	103.49±39.64	104.44±103.07	-0.057	0.177
Operation duration (in minutes)	66.74±26.76	60.23±23.27	1.204	0.506
Scores of postoperative pain	3.53±0.86	2.77±0.72	4.507	0.286
Follow-up advices (in days)	10.00±0.00	10.00±0.00	-	-
Time to back in normal activities (in days)	5.91±1.31	5.33±1.210	2.142	0.643

considered as statistically significant value.

A significant association was found between sex and timing of surgery (p=0.012), with all male patients undergoing early laparoscopic cholecystectomy. Clinical features such as nausea, vomiting, and positive Murphy's sign were significantly more common in the early group (p<0.05), indicating more acute presentations. No significant differences were observed in residence, anaemia, postoperative complications, conversion to open surgery, or port site infection, suggesting both early and delayed surgeries have comparable safety profiles (p>0.05) (Table-II).

Table-II: Clinical characteristics and surgical outcomes of patients undergoing early and delayed laparoscopic cholecystectomy (N=86)

Variables	Categories	n	Laparoscopic Cholecystectomy		Test of significance	p-value
			Early no. (%)	Delayed no. (%)		
Sex	Male	7	7(16.3)	0(0.0)	7.620b	0.012
	Female	79	36(83.7)	43(100)		
Residence	Urban	13	7(16.3)	6(14.0)	0.091a	1.000
	Rural	73	36(83.7)	27(86.0)		
Clinical features (Nausea)	Absent (-)	36	5(11.6)	31(72.1)	32.298a	0.000
	Present (+)	50	38(88.4)	12(27.9)		
Clinical features (Vomiting)	Absent (-)	49	9(20.9)	40(93.0)	45.585a	0.000
	Present (+)	37	34(79.1)	3(7.0)		
Clinical features (Anaemia)	Absent (-)	79	39(90.7)	40(93.0)	0.156b	1.000
	Mild (+)	7	4(9.3)	3(7.0)		
Clinical features (Murphy's sign)	Absent (-)	38	1(2.3)	37(86.0)	61.105a	0.000
	Present (+)	48	42(97.7)	6(14.0)		
Per-operative complications	Yes	5	3(7.0)	2(4.7)	0.212b	1.000
	No	81	40(93.0)	41(95.3)		
Conversion to open surgery	Yes	5	4(9.3)	1(2.3)	1.911b	0.360
	No	81	39(90.7)	42(97.7)		
Presence of port Site infection	Yes	7	5(11.6)	2(4.7)	1.400b	0.217
	No	79	38(88.4)	41(95.3)		

a=Chi-square and b=Fisher exacttest done, p<0.05 considered as statistically significant value

Discussion:

In this study the mean age in group-A was 38.49±12.84 years and in group-B was 42.51±14.29 years, which is statistically insignificant (p=0.372). In the similar study by Lo et al. the difference between mean age of early group (59years) and delayed (61 years) was statistically insignificant (p=0.812).[10] Gul et al reported lower mean age of39.83±8.25 years in Indian such patients while Barcelo et al in 2013 reported much higher age of 67.36±15 years in Spanish population.[11,12] There were 7 male and 79 female patients in the study sample giving a male: female ratio of 1:11.28. A similar female predominance has been reported previously by Mustafa et al in 2016(1:4.26), Gul et al in 2013(1:4) and Gutt et al in 2013(1: 1.69).[4,11,12] Barcelo et al however observed male predominance (1.54:1) among Spanish such patients.[13] These differences in age and gender may be due to population differences in the etiopathogenesis of cholecystitis.

The duration of surgery in this study was 66.74±26.76 minutes in early group and

60.23±23.27 minutes in delayed group, the difference in time was not statistically significant (P- value:0.506). In Sadaf et al the mean operating time was 64.32 min versus 58.24 min in the delayed group, the difference in time was statically significant.[8] In the studies by Rajneesh et al, Chang TC et al lai et al there was significant longer duration in early group than delayed group.[1,14,15] Rahul et alhad significantly longer operating time in their delayed group as compared to early group (108.5 v/s 69.3 min, p value 0.001).[5] Similar type of studies by Kolla et al, Uysal E et al, Johansson et al reported that there was no statistically significant difference in the duration of operation among the groups.[16,17,18]

The overall per-operative complication(bleeding) rate in early group was 7% vs. 4.7% in the delayed group. This report was statistically not significant. Similar result was reported by Sadaf et al (23.3% vs. 36.7%), Johansson et al (18% vs. 8%) and Kolla et al (20% vs. 15%).[8,18,16] Study by Lai et al also found no difference in the complication rate between the two groups (9% vs. 8%). However, in other two prospective controlled studies by Lo et al (29%) and Gonzalez-Rodriguez et al (17.7%) had shown significantly higher complication in the delayed group than in the early group.[10,19]

In this study there was 4(9.3%) conversion to open cholecystectomy in early group whereas 1(2.3%) conversion in delayed group and the difference between two groups was found statistically insignificant. Study by Sadaf et al. had shown 15. 5% conversion rate in early versus 14.4% in delayed group.[8] The conversion rates in most of the studies lie in acceptable range and are comparable to our study. The mean hospital stay was 4.44±1.47 days in the early group and 4.51±1.78 days in the delayed group with a p value of 0.391 which is insignificant. Studies by Akhter N N et al, Kolla et al also found no statistical difference in mean hospital stay.[20,16] However Johansson et al and Rahul Chhajed et al found total hospital stay was significantly shorter in early group than the delayed group.[5,18] In this study, time to back in normal activities (in days) was 5.91±1.31 in early group and 5.33±1.210 in delayed group which is not significant. In our country this time is almost similar in case of laparoscopic surgeries. On 10th POD follow up, port site infection was found in 5 patients in early group and only 2 patients in delayed group. This result is insignificant and reflects the sterile surgical practice in the hospital.

Limitations:

This single-center study with a small sample size and short follow-up period may limit the generalizability of the findings. Non-randomized group allocation based on symptom onset could introduce selection bias.

Conclusion:

This study demonstrates that early and delayed laparoscopic cholecystectomy has comparable safety profiles, operative times, hospital stays, and postoperative recovery. However, early surgery is associated with more acute clinical and laboratory findings, including higher white blood cell counts, serum bilirubin levels, and more pronounced symptoms such as nausea, vomiting, and positive Murphy's sign. Delayed surgery, while associated with a longer duration of preoperative pain, does not increase complications or adversely affect recovery. Based on these findings, early laparoscopic cholecystectomy is recommended for patients presenting within 72 hours of symptom onset to address acute inflammation promptly, while delayed surgery remains a safe alternative for patients presenting later or requiring initial conservative management.

Conflict of Interest:

The authors declare that they have no competing interests.

References:

1. Rajneesh K, Sarjeet SM, RPS Walia, Subhash G. Comparison between early and delayed laparoscopic cholecystectomy in Acute Cholecystitis: A prospective Study. Int J Surg. 2020; 12(3):74-79.doi:10.26611/1061231
2. Jшrgensen T. Prevalence of gallstones in a Danish population. Am J Epidemiol. 1987 Nov;126(5): 912-21. doi: 10.1093/oxfordjournals.aje.a114728.
3. Halldestam I, Kullman E, Borch K. Incidence of and potential risk factors for gallstone disease in a general population sample. Br J Surg. 2009 Nov;96(11):1315-22. doi: 10.1002/bjs.6687.
4. Mustafa ITM, ALAA ITM, Salman MC, Rami I TM. Early vs Delayed Laparoscopic Cholecystectomy in acute cholecystitis. PJMHS. 2016;10(2):371-373.
5. Rahul C, Ramesh D, Arun F, Deepak P. Early versus delayed laparoscopic cholecystectomy for acute cholecystitis: A comparative study. Int J Surg. 2018;5(10):3381-3385.10.18203/2349-2902.isj20184093
6. Soper NJ, Stockmann PT, Dunnegan DL, Ashley

SW. Laparoscopic cholecystectomy. The new 'gold standard'? Arch Surg. 1992 Aug;127(8):917-21; discussion 921-3. doi: 10.1001/archsurg.1992.01420080051008.
7. Siddiqui T, MacDonald A, Chong PS, Jenkins JT. Early versus delayed laparoscopic cholecystectomy for acute cholecystitis: a meta-analysis of randomized clinical trials. Am J Surg. 2008 Jan;195(1):40-47. doi: 10.1016/j.amjsurg.2007.03.004.
8. Khalid S, Iqbal Z, Bhatti AA. Early Versus Delayed Laparoscopic Cholecystectomy For Acute Cholecystitis. J Ayub Med Coll Abbottabad. 2017 Oct-Dec;29(4):570-573
9. Cuschieri A, Dubois F, Mouiel J, Mouret P, Becker H, Buess G, et al. The European experience with laparoscopic cholecystectomy. Am J Surg. 1991 Mar;161(3):385-387. doi: 10.1016/0002-9610(91)90603-b.
10. Lo CM, Liu CL, Fan ST, Lai EC, Wong J. Prospective randomized study of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. Ann Surg. 1998 Apr;227(4):461-7. doi: 10.1097/00000658-199804000-00001
11. Gul R, Dar RA, Sheikh RA, Salroo NA, Matoo AR, Wani SH. Comparison of early and delayed laparoscopic cholecystectomy for acute cholecystitis: experience from a single center. N Am J Med Sci. 2013 Jul;5(7):414-8. doi: 10.4103/1947-2714.115783.
12. Gutt CN, Encke J, Kuninger J, Harnoss JC, Weigand K, Kipfmьller K, et al. Acute cholecystitis: early versus delayed cholecystectomy, a multicenter randomized trial (ACDC study, NCT00447304). Ann Surg. 2013 Sep;258(3):385-93. doi: 10.1097/SLA.0b013e3182a1599b.
13. Barcelo M, Cruz-Santamaria DM, Alba-Lopez C, Devesa-Medina MJ, Diaz-Rubio M, Rey E. Advantages of early cholecystectomy in clinical practice of a terciary care center. Hepatobiliary Pancreat Dis Int. 2013 Feb;12(1):87-93. doi: 10.1016/s1499-3872(13)60011-9.
14. Chang TC, Lin MT, Wu MH, Wang MY, Lee PH. Evaluation of early versus delayed laparoscopic cholecystectomy in the treatment of acute cholecystitis. Hepatogastroenterology. 2009 Jan-Feb;56(89):26-8
15. Lai PB, Kwong KH, Leung KL, Kwok SP, Chan AC, Chung SC, et al. Randomized trial of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. Br J Surg. 1998 Jun;85(6):764-7. doi: 10.1046/j.1365-2168.1998.00708.x
16. Kolla SB, Aggarwal S, Kumar A, Kumar R, Chumber S, Parshad R, et al. Early versus delayed laparoscopic cholecystectomy for acute cholecystitis: a prospective randomized trial. Surg Endosc. 2004 Sep;18(9):1323-7. doi: 10.1007/s00464-003-9230-6.
17. Uysal E, Turel KS, Sipahi M, Isik O, Yilmaz N, Yilmaz FA. Comparison of Early and Interval Laparoscopic Cholecystectomy for Treatment of Acute Cholecystitis. Which is Better? A Multicentered Study. Surg Laparosc Endosc Percutan Tech. 2016 Dec;26(6):e117-e121. doi: 10.1097/SLE.0000000000000345.
18. Jhason M, Thune A, Lundell L. A prospective randomized trial comparing early versus delayed laparoscopic cholecystectomy in the treatment of acute cholecystitis. Gastroerology. 2002;123-24.
19. Gonzбlez-Rodrнguez FJ, Paredes-Cotorй JP, Pontyn C, Rojo Y, Flores E, Luis-Calo ES, et al. Early or delayed laparoscopic cholecystectomy in acute cholecystitis? Conclusions of a controlled trial. Hepatogastroenterology. 2009 Jan-Feb; 56(89):11-6.
20. Nasir NA, Ahmed F, Khalid MA. Early versus delayed Laparoscopic Cholecystectomy in acute Cholecystitis. PJMHS. 2016;10(3):1039-1043.