

Comparison of Laparoscopic vs Open Cholecystectomy in Acute Cholecystitis Presenting within 5 days of Onset of Symptoms

Mudassar Murtaza^{1*}, Mumtaz Ali², Warda Khalid¹, Aslam Javed³, Guled Ahmed⁴

ABSTRACT

OBJECTIVE: To compare the result of open and laparoscopic cholecystectomy in managing acute cholecystitis presenting within 5 days.

METHODOLOGY: This prospective comparative study was conducted at Government Teaching Hospital Shahdara Lahore from December 2020 to March 2023. Eighty patients with acute cholecystitis of 5 days or less duration and age >20 years were included and allocated into two groups, 40 in each. Non-probability convenient sampling was used. Group O was treated with open cholecystectomy, and Group L was treated with Laparoscopic cholecystectomy. Patients with empyema, common duct stones, liver failure and ASA grade >3 were excluded. Demographic data, operative time, complications, conversion rate to open surgery, hospital stay, and follow-up were recorded in proforma. Data entry and analysis were done using SPSS 24.

RESULTS: Group O and Group L's mean age was 43.27±13.33 and 44.07±12.77 years, respectively. Gender distribution differed between Group O (5 males, 35 females) and Group L (8 males, 32 females). Hospital stay was significantly more extended in Group O (5.15±0.92 days) compared to Group L (2.67±0.72 days), with a significant difference in mean operative time (Group O: 75.20mins, Group L: 60.15mins). Wound infection rates were higher in Group O (3 patients) than in Group L (1 patient), and 2 out of 40 patients in the laparoscopic group required conversion to open surgery.

CONCLUSION: Cholecystectomy, whether laparoscopic or open, is safe within 5 days of onset of acute cholecystitis with some benefit in laparoscopic surgery in terms of length of stay and recovery.

KEYWORDS: Open cholecystectomy, Laparoscopic cholecystectomy, acute cholecystitis, Complications, Common Bile Duct injury.

INTRODUCTION

Biliary tract disease is a common cause of hospital admissions, with acute cholecystitis accounting for approximately 20% of cases. In the United States, around 200,000 patients are admitted to hospitals each year due to acute cholecystitis¹. Initially, acute cholecystitis has been managed conservatively, followed by interval cholecystectomy after a few weeks. However, these patients may suffer from recurrent episodes of acute cholecystitis, necessitating readmission to the hospital while awaiting surgical intervention.

In the past, surgeons primarily focused on surgical intervention during the acute inflammatory phase. Within 72-96 hours of acute inflammation, the gall bladder appears edematous with intact tissue planes, making gall bladder removal easier. After this period,

the acute inflammatory response advances towards increased vascular adhesions and evolves with fibrotic alterations. This results in the obliteration of tissue planes. Numerous studies have indicated that cholecystectomy is best performed during the acute phase of acute cholecystitis.

Nevertheless, the optimal timing of surgery for acute cholecystitis varies across different healthcare settings, depending on the surgeon's expertise and preferences. Nonetheless, most surgeons deem it a safe approach if conducted within 72 hours of symptom onset. Some studies also suggest a certain level of safety even beyond the first Week of symptom onset². In Pakistan, patients commonly arrive at healthcare facilities at a later stage than optimal, often as a result of a combination of social and healthcare-related challenges^{3,4}. Although there are some international studies to support cholecystectomy beyond 72 hours, this has not been conducted in local setups vastly due to reluctance and the benefits of laparoscopic surgery are now widely recognized. Progress in laparoscopic imaging technology has made it possible to perform surgeries even in challenging anatomical situations encountered in cases of acute cholecystitis. While some surgeons still opt for open surgery in cases of acute cholecystitis due to hesitancy and lack of access to laparoscopes in emergency settings, our study was carried out to

¹Department of Surgery, Central Park Medical College, Lahore, Pakistan

²Government Teaching Hospital, Shahdara, Lahore, Pakistan

³Department of Surgery, PAK Red Crescent Medical College, Lahore, Pakistan

⁴Ladnaan Hospital, Mogadishu, Somalia

Correspondence: drmudassirmurtaza@gmail.com

doi: 10.22442/jlumhs.2024.01142

Received: 15-04-2023

Revised: 26-08-2024

Accepted: 27-08-2024

Published Online: 14-10-2024



assess the safety of laparoscopic surgery in patients presenting within five days of symptom onset. This study aims to contribute to the early and comprehensive management of such cases, reducing morbidity and minimizing multiple hospital visits for patients awaiting resolution of acute cholecystitis.

METHODOLOGY

A prospective comparative study was conducted at Government Teaching Hospital Shahdara, Lahore, from December 2020 to March 2023. The study aimed to investigate whether laparoscopic cholecystectomy is superior to open cholecystectomy in patients with acute cholecystitis who seek medical attention within five days of symptom onset. A total of 80 patients diagnosed with acute cholecystitis based on clinical and sonographic assessments were included in the study. After the hospital's ethical committee approval, informed consent was obtained from patients, and confidentiality was maintained throughout the research and follow-up. Non-probability convenient sampling was utilized. The participants were individuals over 20 years old who presented within five days (120 hours) of the onset of symptoms and were divided into two groups: Group O, which underwent open cholecystectomy, and Group L, consisting of patients who underwent laparoscopic cholecystectomy with standard four ports. Patients with sepsis, common bile duct stones, advanced liver disease, ASA grade IV and V, and empyema were excluded from the study. Demographic information, operative time, complications, length of hospital stay, and follow-up data were documented in the proforma after obtaining informed consent from the patients.

The data gathered was entered into SPSS version 24 and subsequently subjected to computational statistical analysis. Mean and standard deviation were computed for variables such as operative time and duration of hospital stay. Frequency and percentage were determined for complications, conversion rate, wound infection, intra-abdominal collection, and chest infection. The Student's t-test was utilized to compare the duration of hospital stay, operative time, and follow-up between groups O and L. The comparison of the complications above was conducted using the Chi-square test. A significance threshold of $p < 0.05$ was employed for interpreting the calculated p-values.

RESULTS

The mean age of patients in Group O and Group L was 43.27 ± 13.33 and 44.07 ± 12.77 years, respectively. Group O's lowest and uppermost ages were 22 and 70 years, respectively. In Group L, the lowest and highest ages of patients were 22 and 86 years, respectively.

In Group O, five patients were male and 35 females. In Group L, eight were male, and 32 were female. Female patients were more than male. The mean hospital stay in Group-O patients was 5.15 ± 0.92 days, while in Group-L, the mean hospital stay was

2.67 ± 0.72 days, respectively. Using the p-value, the mean stay in the hospital was statistically different in both groups, and it was less in the laparoscopic group. **Table I** shows a significant difference in operative time between the two groups, which is lesser in the laparoscopic group.

TABLE I: OPERATIVE TIME (MINUTES) IN BOTH TREATMENT GROUPS

	Group distribution	
	Group O	Group L
N	40	40
Mean	75.20	60.15
SD	6.38	4.03
Minimum	68.00	49.00
Maximum	100.00	69.00

T-Test= 12.60

P-value= 0.000

Group O= Open Cholecystectomy

Group L= Laparoscopic Cholecystectomy

Regarding p-value, no significant association was present between wound infection and treatment groups. Still, it was observed that the wound infection rate in Group-L patients was low as compared to Group-O patients. (**Table II**)

TABLE II: INFECTION RATE IN TWO GROUPS

	Groups		Total
	Group O	Group L	
Yes	3(7.5%)	1(2.5%)	4(5%)
No	37(92.5%)	39(97.5%)	76(95%)
Total	40	40	80

Chi-Square Test= 1.053

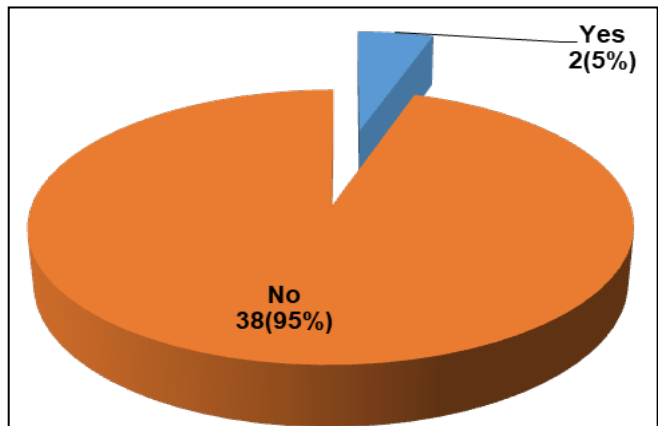
P-value= 0.305

Group O= Open Cholecystectomy

Group L= Laparoscopic Cholecystectomy

Two patients from the L group were converted to open procedures due to bleeding in one patient and adhesions in the other. **Figure 1.**

FIGURE I: CONVERSION RATE IN LAPAROSCOPIC GROUP



None of the patients in both groups suffered common bile duct or duodenal injury. 1st-week post-operative follow-up of patients showed that none in both treatment groups had any active issue. During 2nd Week of operative follow-up, none of the patients in Group O had any active issues. In Group L, two patients had active problems. i.e. (one patient suffered from mild pain in the right hypochondrium, and the other patient suffered from mild pain on the umbilical port site). None of the patients in Group O and Group L had any active issues at 1st month post-operative follow-up.

DISCUSSION

Traditional teachings regarding the management of acute cholecystitis were focused on conservative management, which included nothing per oral, intravenous fluids and antibiotics. Surgery was performed after several weeks (usually six weeks) when acute inflammation was settled to facilitate surgery and prevent iatrogenic injuries. Patients with acute acalculous cholecystitis are still better managed without surgery⁵. In high-risk geriatrics populations, percutaneous Cholecystostomy can be offered⁶. According to Tokyo guidelines, acute cholecystitis can be divided into three categories depending on its severity⁷.

It appears safe to perform surgery in mild acute cholecystitis. However, the surgery may become complex in moderate to severe acute cholecystitis.

With time, most surgeons now prefer early surgery in acute cholecystitis due to improved instruments, laparoscopes, hemostatic and energy devices, and better perioperative care. In a recent systematic review of 17 studies, emergency cholecystectomy was superior to percutaneous transhepatic biliary drainage in high-risk patients, which was considered the preferred approach in these patients. Post-operative mortality was 2.37% in the cholecystectomy group as compared to 13.78% in the transhepatic drainage group⁸.

A systematic review by Mannam R et al.⁹ concluded that laparoscopic cholecystectomy is better than the open procedure concerning early recovery and hospital stay. However, cost, as opposed to common belief, was not different in both groups. However, they recommended that severe cholecystitis cases should be managed on an individual basis, preferring laparoscopic surgery first and, if not successful, then convert to open procedure. It will also benefit students exposed to open surgeries, which decrease daily due to improved techniques and equipment, leading to early recovery. Similarly, the World Society of Emergency Surgery also issued guidelines to endorse the preferred laparoscopic approach in emergency cholecystectomies¹⁰. One of the most extensive studies was done by Burka M et al.², who operated on 564 patients and compared the outcomes if performed within one Week or later than one Week. They concluded that surgery is safe regarding complications

even beyond the first Week. However, the operative time was 90 minutes in the more than seven days group compared to 80 minutes in the less than seven days group.

Most of the literature defines early cholecystectomy as surgery performed within 72 hours. However, the debate will continue. We performed surgery in mild cases only for those who presented within five days (120 hours) of the onset of symptoms and signs, which was unusual in most studies. Ghoneim AT 2020¹¹ also compared laparoscopic surgery in mild to moderately severe cases who presented within 72 hours, after 72 hours but less than seven days and after seven days. They concluded that bleeding, other complications and operative time were more in the moderate and late cholecystectomy group. In late groups, there was increasing difficulty (adhesions, spillage, decompression required, and retrieval). The mean operative time was 24 mins in mild and 84 mins in moderate group. In our study, the laparoscopic group spent about 60 minutes. Twenty-two high-risk geriatrics were compared by Yamazaki S et al.¹², who underwent urgent laparoscopic cholecystectomy, with 13 patients who initially underwent percutaneous drainage and then cholecystectomy after 72 days. Operative time, bleeding, and complication rates showed no significant difference between the two groups.

However, the duration of treatment was significantly better in the urgent laparoscopic surgery group (11 vs 71 days)¹². A Quasi-experimental study by Waqar SH 2020¹³ at PIMS in 143 patients also concluded that laparoscopic cholecystectomy is safe in 72 hours. It was almost consensus that 72 hours is a relatively safe period. However, they used three rather than four ports, as in our study. One study published at BMC Surgery concluded that cholecystectomy becomes difficult and has more complications if performed after initial percutaneous transhepatic gallbladder drainage¹⁴. A review article by Khan ZU 2022¹⁵ suggested that the early or delayed approach should be individualized. All studies conducted in Pakistan were all about cholecystectomy within 72 hours. International literature, however, now favours early surgery. Our study has extended the safety period beyond 72 hours without compromising the quality. The limitation of our study is that the consultant did surgery with more than five years of clinical and teaching experience. Junior surgeons and residents must be careful about surgery under challenging situations.

CONCLUSION

We concluded that laparoscopic cholecystectomy is a technically demanding but safe and effective procedure for the management of acute cholecystitis, even in the first five days of presentation provided if performed with expert hands.

Ethical permission: Government Teaching Hospital, Shahdara, Lahore, ERB letter No. GTHS/EC/2020/37.

Conflict of Interest: No conflicts of interest, as stated by authors.

Financial Disclosure / Grant Approval: No funding agency was involved in this research.

Data Sharing Statement: The corresponding author can provide the data proving the findings of this study on request. Privacy or ethical restrictions bound us from sharing the data publicly.

AUTHOR CONTRIBUTION

Murtaza M: Concept, design, data analysis, final approval

Ali M: Data collection, drafting

Khalid W: Data collection, data analysis, final approval

Javed A: Data analysis, manuscript writing

Ahmed G: Study concept, data collection

REFERENCES

1. Espino EA, Kazaleh M, Zaglul J, Frontela O. Acute cholecystitis presenting with atypical radiologic or laboratory findings: A case report. *Cureus*. 2023; 15(6): e41217. doi: 10.7759/cureus.41217.
2. Barka M, Jarrar MS, Sahli J, Abdessalem ZB, Hamila F, Youssef S. Early laparoscopic cholecystectomy for acute cholecystitis: should we operate beyond the first Week? *Langenbecks Arch Surg*. 2023; 408(1): 68. doi: 10.1007/s00423-023-02816-5.
3. Khatti SN, Nasir S, Chandio MMA, Bhatti SG, Khan A, Arshad R. Gallstone disease and causes for its late presentation in Pakistan. *HIV Nursing*. 2023; 23(3): 720-723.
4. Kazimi SAR, Saeed S, Shafique A, Dynamo MMA, Hashmi JS, Khan SA. To evaluate causes of delayed presentation of gallstone disease: a retrospective study at Punjab Rangers Teaching Hospital, Lahore. *PAK J Surg*. 2020; 36(4): 281-285.
5. Chang C, Wang Y, Shi W, Xu H, Huang X, Jiao Y. Is conservative management a safe approach for patients with acute acalculous cholecystitis presenting with an acute abdomen? *Medicine (Baltimore)*. 2023; 102(35): e34662 doi: 10.1097/MD.00000000000034662.
6. Gundogdu H, Demiral G. Percutaneous Cholecystostomy in high-risk geriatric patients with acute cholecystitis. *J Coll Physicians Surg Pak*. 2021; 31(07): 770-774. doi: 10.29271/jcpsp.2021.07.770.
7. Yokoe M, Hata J, Tasaday T, Strasberg SM, Asbun HJ, Wakabayashi G et al. Tokyo Guidelines 2018: diagnostic criteria and severity grading of acute cholecystitis (with videos). *J Hepatobiliary Pancreat Sci*. 2019; 25(1): 41-54. doi: 10.1002/Jobportal.515.
8. Cirrocchi R, Amato L, Ungania S, Buononato M, Tebala GD, Cirillo B et al. Management of acute cholecystitis in high-risk patients: percutaneous gall bladder drainage as a definitive treatment vs emergency cholecystectomy-systematic review and meta-analysis. *J Clin Med*. 2023; 12(15): 4903. doi: 10.3390/jcm12154903.
9. Mannam R, Narayanan SR, Bansal A, Yanamaladoddi VR, Sarvepalli SS, Vemula SL et al. Laparoscopic Cholecystectomy Versus Open Cholecystectomy in Acute Cholecystitis: A Literature Review. *Cureus*. 2023; 15(9): e45704. doi:10.7759/cureus.45704.
10. Sermonesi G, Tian BWCA, Vallicelli C, Abu-Zidan FM, Damaskos D, Kelly MD. Cesena guidelines: WSES consensus statement on laparoscopic-first approach to general surgery emergencies and abdominal trauma? *World J Emerg Surg*. 2023; 18(1): 57. doi: 10.1186/s13017-023-00520-9.
11. Ghoneim AT, El-Soueni H, Mahmoud M, El-Dawy WA. Evaluation of laparoscopic cholecystectomy in acute cholecystitis. *BMFJ*. 2020; 37(Special Issue-Surgery): 1-19. doi: 10.21608/bmfj.2020.19368.1159.
12. Yamazaki S, Shimizu A, Kubota K, Notake T, Yoshizawa T, Masuo H et al. Urgent versus elective laparoscopic cholecystectomy following percutaneous Transhepatic gallbladder drainage for high-risk grade II acute cholecystitis. *Asian J Surgery*. 2023; 46(1): 431-7. doi: 10.1016/j.asjsur.2022.05.046.
13. Waqar SH, Abdullah MT, Shah SA, Malik ZI, Shahzad F. Outcome of laparoscopic cholecystectomy in patients of acute cholecystitis. *JIIIMC*. 2020; 15(3): 149-153.
14. Liu YQ, Cai X, Zheng ZX. Increased difficulty and complications of delayed laparoscopic cholecystectomy following percutaneous transhepatic gallbladder drainage in acute cholecystitis: a retrospective study. *BMC Surg*. 2023; 23: 277. doi: 10.1186/s12893-023-02185-2.
15. Khan ZU. Cholecystectomy for acute cholecystitis: Wait or Operate? *Pak J Surg*. 2022; 38(4): 209-13.

