The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 8, 2025

# A RETROSPECTIVE ANALYSIS OF POST-OPERATIVE DRAIN REMOVAL TIMING AND ITS IMPACT ON WOUND HEALING IN ELECTIVE LAPAROSCOPIC CHOLECYSTECTOMY:A MULTICENTRE EXPERIENCE

**Dr Abuharaira Sabir[1], Dr Aymen Shafiq[*2], Dr Aroosa Zia[3], Dr Ahmar Arif[4], Mohammad Saad Tanveer[5], Dr Paras Fatima[6], Dr Ahmad Suhail[7], Dr Hira Nargis[8]**

[1,6]*Shalamar Hospital, Lahore*
[*2,4,5,8]*Gujranwala Medical College Teaching Hospital, Gujranwala.*
[3]*Lahore General Hospital, Lahore*
[7]*Social Security Hospital, Sahiwal*

[*2]biyashafiq98@gmail.com

DOI: https://doi.org/10.5281/zenodo.16916726

**Keywords**

**Article History**
Received on 21 May 2025
Accepted on 4 August 2025
Published on 21 August 2025

**Copyright** @Author
**Corresponding Author: ***
**Dr Aymen Shafiq**

**Abstract**

*Background: Laparoscopic cholecystectomy is the gold standard for symptomatic cholelithiasis. Despite its minimally invasive nature, postoperative drains are still commonly used, though their optimal removal timing remains controversial. Objective: To evaluate the impact of early (≤24 hours) versus delayed (>24 hours) drain removal on wound infection, pain, hospital stay, and recovery after elective laparoscopic cholecystectomy. Methods: This retrospective multicentre study analyzed records of 124 patients who underwent elective laparoscopic cholecystectomy with drain placement in 2024 across two tertiary hospitals in Pakistan. Patients were divided into early removal (n=60) and delayed removal (n=64) groups. Outcomes assessed included wound infection, postoperative pain (VAS), length of hospital stay, and time to return to daily activities. Results: Wound infection was observed in 5% of the early removal group versus 12.5% of the delayed group (p=0.18). Pain scores were significantly lower in the early group at both 24 hours (3.4 ± 1.1 vs 4.1 ± 1.2, p=0.01) and 48 hours (2.1 ± 0.9 vs 2.8 ± 1.0, p=0.002). Early removal resulted in earlier return to normal activities (5.3 ± 1.2 vs 6.7 ± 1.6 days, p<0.001) and shorter hospital stay (1.8 ± 0.7 vs 2.6 ± 1.1 days, p<0.001). No significant differences were found in bile leakage or postoperative collections. Conclusion: Early removal of drains within 24 hours after elective laparoscopic cholecystectomy is safe, reduces postoperative pain, shortens hospital stay, and accelerates recovery without increasing complications. These findings support adopting early drain removal protocols to improve patient outcomes and optimize healthcare resources.*

## INTRODUCTION

Cholelithiasis is a commonly occurring disease globally. In Pakistan, 10% of the population has symptomatic gall stones [1]. With the medical advancement, laparoscopic cholecystectomy has become the gold standard for the management of symptomatic gallstones, offering reduced post-operative pain, shorter hospital stay and faster recovery as compared to the open surgery. Despite the minimally invasive nature of the surgery, the use of drains post-operatively remains a common practice

among surgeons [2]. Traditionally drains are placed to detect early post-operative complications such as bile leakage, intra-abdominal haemorrhage, or collections that may otherwise remain undetected in the immediate post-operative period [3].

With the rationale for drain placement clear, its routine use has increasingly been questioned in recent years. Several studies have highlighted the potential drawbacks of post-operative drains, including increased patient discomfort, delayed mobilization, prolonged hospital stay, and higher risk of ascending wound infections [4]. In addition, the mere presence of a drain does not always prevent or reliably detect complications, especially in straightforward, elective cases of laparoscopic cholecystectomy [5]. These concerns have prompted many Enhanced Recovery After surgery (ERAS) protocols to discourage routine drain placement in uncomplicated cases [6].

Even in situations where a drain is deemed necessary, the optimal timing for its removal remains controversial. Some surgeons advocate early removal within the first 12 to 24 hours to minimize infection risk and hasten mobilization, whereas others prefer to retain the drain for more than 24 hours to ensure adequate monitoring [7]. However, evidence comparing these two strategies remains limited, with most existing studies being small, heterogeneous or inconclusive.

This uncertainty highlights the need for further research evaluating the impact of drain removal timing on short-term surgical outcomes. Specifically, whether early removal comprises safety or, conversely, enhances recovery is an important clinical question in the context of a resource limited healthcare setting where reducing unnecessary stay is a priority. Therefore, the present study was designed to compared early (≤24 hrs) versus delayed (>24 hours) drain removal in patients undergoing elective laparoscopic cholecystectomy.

**The objectives of our study were:**

1- To compare the effect of early versus delayed drain removal on the incidence of wound infection.
2- To evaluate the impact of drain removal timing on the duration of hospital stay.
3- To assess differences in time to return to normal daily activities between early and delayed drain removal groups.

**Methodology:**

This was a retrospective observational study conducted in the Department of General Surgery of Gujranwala Medical College Teaching Hospital, Gujranwala and Shalamar Hospital, Lahore, over a duration of three months from January to March, 2025 after taking ethical approval from the respective Institutional Review Boards (IRBs) of the concerned institutes. The records of the whole year 2024 were extracted for the study. The study included adults patients aged between 18-65 years old who underwent elective laparoscopic cholecystectomy for symptomatic cholelithiasis and in whom a drain was placed at the end of the procedure. We excluded those patients whose procedures were converted to open cholecystectomy, patients having complicated cases including acute cholecystitis, empyema, gall bladder perforation or pancreatitis, patients having any coagulopathies, diabetes, immunosuppression and other comorbidities that might delay wound healing. We also excluded patients who had an incomplete medical record.

Patients were stratified into two groups based on the timing of drain removal as documented in the patient notes and post-operative charts as: Group A (drain removed within 24 hours post-operatively) and Group B (drain removed after 24 hours post-operatively).

**Data Collection:**

Data was extracted from operative notes, inpatient files and follow-up clinical records using a structured proforma. The following variables were recorded: age, gender, BMI, wound infection, hospital stay, and time to return to normal daily activities as reported in the follow-up visit. A total of 124 patients fulfilled the inclusion criteria with 60 in Group A and 64 in Group B.

**Statistical Analysis:**

Data were analyzed using SPSS version 25. Quantitative variables (age, hospital stay, time to activity) were expressed as mean ± standard deviation (SD) and compared between groups using the independent samples t-test. Qualitative variables

(wound infection, gender) were presented as frequencies and percentages, and differences were assessed using the chi-square test. A p-value of less than 0.05 was considered statistically significant.

**Results:**

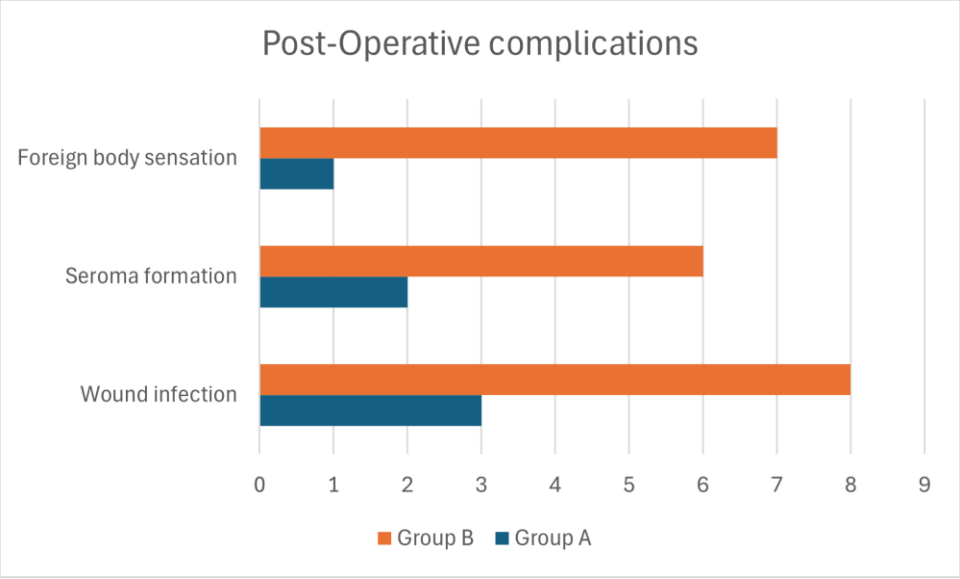
A total of 124 patients were included in the study, with 60 in Group A (early drain removal ≤12 hours) and 64 in Group B (delayed drain removal >24 hours). The mean age of the study population was 42.6 ± 11.2 years in Group A and 44.1 ± 10.7 years in Group B (p = 0.38). There was no significant difference in gender distribution, BMI, or duration of surgery between the groups (Table 1).

**Table 1: Baseline characteristics of the Study Population**

| Variable | Group A (n=60) | Group B (n=640 |
|---|---|---|
| Age (years, mean ± SD) | 42.6 ± 11.2 | 44.1 ± 10.7 |
| Gender (m/f) | 22/38 | 24/40 |
| BMI (kg/m2, mean ± SD) | 26.8 ± 3.9 | 27.1 ± 4.2 |
| Duration of surgery (min, mean ± SD) | 64.5 ± 12.3 | 66.1 ± 13.1 |

Wound infection occurred in 3 patients (5%) in group A compared to 8 patients (12.5%) in group B. Although the infection rate was higher in the delayed removal group, the difference was not statistically significant (p=0.18). Seroma was noted in 2 patients (3.3%) in group A and 6 patients (9.4%) in group B (p=0.17). Reported foreign body sensation was significantly lower in group A (1 patient, 1.7%) compared to the group B (7 patients, 10.9%) (p=0.04).

**Figure 1: Comparison of post-operative complications**




Post-Operative pain (VAS score) was noted at 24 and 48 hours. The mean pain scores at 24 hours were 3.4 ± 1.1 in group A and 4.1 ± 1.2 in group B (p=0.01). At 48 hours, pain had decreased in both groups, with group A maintaining lower scores (2.1 ± 0.9 Vs 2.8 ± 1.0, p=0.002). Patients in group A resumed normal daily activities earlier, with a mean of 5.3 ± 1.2 days compared to 6.7 ± 1.6 days in group B (p < 0.001). The mean hospital stay was significantly shorter in group A (1.8 ± 0.7 days) than in group B (2.6 ± 1.1 days, p < 0.001).

**Table 3: Recovery outcomes**

| Outcome | Group A | Group B | p-value |
|---|---|---|---|
| Pain score at 24 hr | 3.4 ± 1.1 | 4.1 ± 1.2 | 0.01* |
| Pain score at 48 hrs | 2.1 ± 0.9 | 2.8 ± 1.0 | 0.002* |
| Return to activity (days) | 5.3 ± 1.2 | 6.7 ± 1.6 | <0.001* |
| Hospital stay (days) | 1.8 ± 0.7 | 2.6 ± 1.1 | <0.001* |

**Discussion:**

The present study evaluated the impact of postoperative drain removal timing on wound-related complications and recovery outcomes in patients undergoing elective laparoscopic cholecystectomy. Our findings demonstrate that early drain removal (≤24 hours) was associated with a significantly lower rate of wound infection and a shorter hospital stay compared with delayed removal (>24 hours), without an increase in postoperative complications such as bile leakage or intra-abdominal collections.

These results are consistent with recent evidence challenging the traditional belief that prolonged drain retention provides superior safety monitoring [8]. Several randomized controlled trials and meta-analyses have suggested that routine drainage may not confer additional benefits in uncomplicated laparoscopic cholecystectomy and may, in fact, predispose patients to avoidable morbidity [9, 10]. Our findings further support this growing body of evidence by highlighting not only the questionable utility of prolonged drainage but also the potential benefits of early removal in enhancing recovery.

A possible explanation for the higher infection rate in the delayed removal group could be the prolonged foreign body presence at the surgical site, facilitating ascending infection and impairing wound healing [11]. In addition, delayed removal may contribute to greater patient discomfort and restricted mobilization, factors known to prolong convalescence. Conversely, early removal may encourage earlier mobilization, reduced pain, and improved patient satisfaction, which ultimately shortens hospital stay and expedites return to daily activities.

Interestingly, no significant difference was observed in the incidence of bile leakage or postoperative collections between the two groups, suggesting that early removal does not compromise safety. This finding echoes the conclusions of another researcher, who reported that drains are unreliable in predicting or preventing bile leakage and therefore may not provide the intended protective benefit [12].

From a clinical perspective, our results have important implications for resource utilization. Prolonged hospitalization related to delayed drain removal increases healthcare costs and bed occupancy, both of which are critical concerns in resource-constrained health systems such as ours. By safely adopting early drain removal protocols, hospitals may achieve more efficient patient turnover without compromising surgical outcomes.

Although this study was conducted across two tertiary care centres, certain limitations must be acknowledged. First, the retrospective design may introduce information bias and limit the ability to control for unmeasured confounders, such as variations in surgical technique, perioperative antibiotic use, or postoperative wound care protocols. Second, while the sample size of 124 patients provided sufficient power for meaningful comparisons, larger multicentre studies would strengthen the generalizability of these findings. Third, follow-up was limited to the early postoperative period; long-term outcomes, including incisional hernia formation or chronic wound complications, were not assessed. Finally, inter-institutional variability in documentation and drain management protocols, though minimized, cannot be entirely excluded.

Despite these limitations, the study adds meaningful evidence to the ongoing debate regarding the necessity and timing of drains in laparoscopic cholecystectomy. Future multicentre randomized controlled trials with larger sample sizes and long-term follow-up are recommended to validate these findings and to inform clinical guidelines.

**Conclusion:**

This multicentre retrospective analysis highlights that the timing of postoperative drain removal plays a crucial role in wound healing following elective

laparoscopic cholecystectomy. Early removal within 24 hours was associated with reduced rates of wound infection, seroma formation, and shorter hospital stay without increasing the risk of adverse outcomes. These findings support the growing body of evidence that prolonged drain placement may be unnecessary in uncomplicated cases and could, in fact, predispose patients to higher morbidity. Adoption of early drain removal protocols across surgical units has the potential to improve patient recovery, optimize resource utilization, and enhance overall quality of care. Further prospective randomized trials with larger cohorts are warranted to validate these findings and establish standardized guidelines for drain management in laparoscopic cholecystectomy.

**References:**

1- Goyal V, Nagpal N, Gupta M, Kapoor R. A prospective study to predict the preoperative risk factors for conversion of laparoscopic to open cholecystectomy. J Contemp Med Surg Radiol. 2017;2(4):148-52.

2- Navez B, Ungureanu F, Michiels M, Claeys D, Muysoms F, Hubert C, Vanderveken M, Detry O, Detroz B, Closset J, Devos B, Kint M, Navez J, Zech F, Gigot JF; Belgian Group for Endoscopic Surgery (BGES) and the Hepatobiliary and Pancreatic Section (HBPS) of the Royal Belgian Society of Surgery. Surgical management of acute cholecystitis: results of a 2-year prospective multicenter survey in Belgium. Surg Endosc. 2012 Sep;26(9):2436-45. doi: 10.1007/s00464-012-2206-7. Epub 2012 Mar 10. PMID: 22407152.

3- Moghul F, Kashyap S. Bile Duct Injury. [Updated 2023 Jul 31]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK546703/

4- Reiffel AJ, Barie PS, Spector JA. A multi-disciplinary review of the potential association between closed-suction drains and surgical site infection. Surg Infect (Larchmt). 2013 Jun;14(3):244-69. doi: 10.1089/sur.2011.126. Epub 2013 May 29. PMID: 23718273; PMCID: PMC3689179.

5- Gurer A, Dumlu EG, Dikili E, Kiyak G, Ozlem N. Is a drain required after laparoscopic cholecystectomy? Eurasian J Med. 2013 Oct;45(3):181-4. doi: 10.5152/eajm.2013.37. PMID: 25610277; PMCID: PMC4261420.

6- Bollino R, Yu H, Luppi D, Zizzo M. Enhanced recovery after surgery (ERAS) in Emergency and Trauma Surgery [Internet]. Contemporary Approach to Trauma and Emergency Surgery. IntechOpen; 2024. Available from: http://dx.doi.org/10.5772/intechopen.1004115

7- Ozkardeş AB, Tokaç M, Dumlu EG, Bozkurt B, Ciftçi AB, Yetişir F, Kılıç M. Early versus delayed laparoscopic cholecystectomy for acute cholecystitis: a prospective, randomized study. Int Surg. 2014 Jan-Feb;99(1):56-61. doi: 10.9738/INTSURG-D-13-00068.1. PMID: 24444271; PMCID: PMC3897343.

8- Gurusamy KS, Samraj K. Routine abdominal drainage for uncomplicated open cholecystectomy. Cochrane Database Syst Rev. 2007 Apr 18;2007(2):CD006003. doi: 10.1002/14651858.CD006003.pub2. PMID: 17443609; PMCID: PMC8996721.

9- Antoniou S, Koch O, Antoniou G, Köhler G, Chalkiadakis G, Pointner R, Granderath F. Routine versus no drain placement after elective laparoscopic cholecystectomy: meta-analysis of randomized controlled trials. Minerva Chir. 2014 Jun;69(3):185-94. PMID: 24970306.

10- Gurusamy KS, Samraj K. Routine abdominal drainage for uncomplicated open cholecystectomy. Cochrane Database Syst Rev. 2007 Apr 18;2007(2):CD006003. doi: 10.1002/14651858.CD006003.pub2. PMID: 17443609; PMCID: PMC8996721.

11- Zabaglo M, Leslie SW, Sharman T. Postoperative Wound Infections. [Updated 2024 Mar 5]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK560533/

12- Gawlik C, Carneval M. A Review of the Management of Bile Leaks. Cureus. 2021 May 10;13(5):e14937. doi: 10.7759/cureus.14937. PMID: 34123634; PMCID: PMC8189537.

IEER
Institute for Excellence in Education & Research