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ASSISTMENT OF EARLY VS DELAYED LAPAROSCOPIC CHOLECYSTECTOMY IN ACUTE GALLSTONE DISEASE

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ABSTRACT

Background: Deciding when to perform laparoscopic cholecystectomy for acute gallstone disease is still an important clinical issue. This study set out to compare the outcomes of Early Laparoscopic Cholecystectomy (ELC) and Delayed Laparoscopic Cholecystectomy (DLC).

Methods: This retrospective observational study took place at District Headquarters (DHQ) Hospital from June 5 to September 1, 2023, and included 100 patients with acute gallstone-related disease. ELC was surgery within 72 hours of diagnosis, while DLC was done at least 6 weeks after the acute episode. The study looked at complication rates, hospital stay, recovery, gallstone recurrence, readmissions, and extra interventions. Independent t-tests and chi-square tests were used for analysis, with $p<0.05$ as the threshold for significance.

Results: The two groups had similar demographics (average age about 48 years, female-to-male ratio 1.15:1). ELC showed clear long-term benefits, such as a lower rate of gallstone recurrence (10% vs 17%; $p<0.05$), fewer readmissions per patient (1.3 vs 1.8), and less need for follow-up imaging (40% vs 52%). More ELC patients had at least partial recovery (70% vs 64%). Although ELC had slightly higher rates of immediate post-operative complications (bile leak: 14% vs 11%; retained stone: 13% vs 9%; pancreatitis: 15% vs 12%), these were managed successfully with endoscopic treatment (ERCP rates: 9% vs 11%). ELC also led to a slightly shorter total hospital stay**:**

Conclusion: Cholecystectomy is associated with superior long-term outcomes, including significantly reduced disease recurrence and healthcare reutilization, as well as better functional recovery. The modest increase in early, manageable complications does not outweigh these benefits. Taken together, the findings strongly support ELC as the preferred strategy for managing uncomplicated acute gallstone disease.

Keywords: Early Laparoscopic Cholecystectomy; Delayed Laparoscopic Cholecystectomy; Gallstone Disease; Acute Cholecystitis; Gallstone Pancreatitis; Postoperative Outcomes; Recurrence; Healthcare Utilization

INTRODUCTION

Gallstone-related diseases are among the most common surgical emergencies worldwide, including conditions like biliary colic, acute cholecystitis, gallstone pancreatitis, and obstructive jaundice [1]. These illnesses make up a large share of hospital admissions and surgeries, with laparoscopic

cholecystectomy being the standard treatment [2]. The best time to operate for acute gallstone disease has been debated for decades. In the past, delayed laparoscopic cholecystectomy (DLC), done weeks after the acute episode to let inflammation settle, was preferred. This was because of worries that surgery during the acute phase could be more difficult and riskier, possibly leading to bleeding, bile duct injury, or needing to switch to open surgery [3]. However, more recent studies have shown that early laparoscopic cholecystectomy (ELC), done during the same hospital stay or within 72 hours of symptoms, is safe and effective [4]. Early surgery can shorten hospital stays, reduce repeat biliary problems while waiting, lower healthcare costs, and improve patient satisfaction [5,6]. Still, not all hospitals and health systems use early surgery, often due to concerns about operating on inflamed tissue and practical challenges in places with fewer resources [7]. Newer research suggests that with better tools and more surgical experience, the risks of early surgery are manageable and do not affect long-term results much [8,9]. Timing is especially important in gallstone pancreatitis. In the past, surgery was delayed until all signs of illness were gone, but new evidence shows that early surgery lowers the risk of repeat pancreatitis and hospital readmissions [10]. A Cochrane review found that doing surgery during the same hospital stay for mild gallstone pancreatitis is not only possible but better, since waiting can lead to more serious problems [11]. International guidelines now reflect this evidence. The Tokyo Guidelines 2018 recommend early laparoscopic cholecystectomy for acute cholecystitis once the patient is stable and ready for surgery [12]. The World Society of Emergency Surgery (WSES) also supports early surgery for acute calculous cholecystitis, noting better outcomes and less strain on healthcare [13]. The European Association for the Study of the Liver (EASL) gives similar advice for gallstone-related diseases [14]. However, there are still differences between what guidelines recommend and what happens in practice, especially in places with limited resources or other priorities [15]. In this context, our study was designed to compare the outcomes of early versus delayed laparoscopic cholecystectomy in 100 patients with acute gallstone-related disease. By looking at surgical timing, hospital stay, complications, recurrence, and recovery, we aim to provide local evidence to help guide clinical decisions and support evidence-based timing for laparoscopic cholecystectomy.

METHODOLOGY

This retrospective observational study was carried out at District Headquarters (DHQ) Hospital from June 5 to September 1, 2023, with ethics committee approval and in line with the Declaration of Helsinki. The study reviewed records of 100 patients aged 18 or older with confirmed acute gallstone-related disease (biliary colic, acute cholecystitis, gallstone pancreatitis, or obstructive jaundice) who had laparoscopic cholecystectomy and complete follow-up. Patients with acalculous cholecystitis, immediate open conversion, suspected biliary cancer, incomplete records, or pregnancy were excluded. Patients were split into two groups based on when they had surgery: Early Laparoscopic Cholecystectomy (ELC, n=50), done within 72 hours of diagnosis, and Delayed Laparoscopic Cholecystectomy (DLC, n=50), done at least 6 weeks after the acute episode following initial conservative treatment. Data were collected from electronic records, operative notes, and follow-up logs, covering demographics, clinical presentation, surgical details, hospital use, complications, and post-discharge outcomes like ERCP need, emergency visits, readmissions, extra imaging, gallstone recurrence, and follow-up time. Recovery at final follow-up was classified as complete (no symptoms, normal activity), partial (mild symptoms, daily activities), or ongoing symptoms needing medical care. Diagnosis was based on symptoms (right upper quadrant pain, fever, nausea/vomiting), lab results (high white blood cells, liver enzymes, amylase/lipase), and imaging (ultrasound, CT, or MRCP showing gallstones or related findings). All patients received standard preoperative care, including IV fluids, pain relief, and antibiotics. ELC patients had surgery within 72 hours, while DLC patients were treated first and scheduled for surgery at least 6 weeks later. All surgeries used the standard four-port laparoscopic method, with selective intraoperative cholangiography if choledocholithiasis was suspected, and conversion to open surgery if needed. After surgery, patients were encouraged to move early, eat as tolerated, and had ERCP if retained stones or bile leak were suspected. Follow-up visits were at 2 weeks, 6 weeks, 3 months, 6 months,

and 12 months, with average follow-up of 15.4 months for ELC and 14.8 months for DLC. Statistical analysis was done using SPSS version 26, with independent t-tests for continuous data and chi-square or Fisher's exact tests for categorical data, using $p<0.05$ as the cutoff for significance. Patient data were anonymized and kept confidential, with informed consent waived due to the retrospective design, as approved by the Institutional Review Board.

RESULTS AND DISCUSSION

The study conducted at Timergara Teaching Hospital, Pakistan, compared early laparoscopic cholecystectomy (ELC, within 72 hours) versus delayed laparoscopic cholecystectomy (DLC, ≥6 weeks) in 100 patients with acute gallstone-related disease, finding that while demographics were similar (mean age ~48, female-to-male ratio ~1.15:1), ELC led to significantly better long-term outcomes, including lower gallstone recurrence (10% vs. 17%; $p<0.05$), fewer readmissions per patient (1.3 vs 1.8; $p<0.05$), reduced need for follow-up imaging (40% vs 52%), and a higher proportion achieving at least partial recovery (70% vs 64%), though immediate post-operative complications like bile leak (14% vs 11%), retained stones (13% vs 9%), and pancreatitis (15% vs 12%) were slightly higher but manageable with ERCP (9% vs 11%) and did not increase major morbidity or mortality, with hospital stay being marginally shorter for ELC; the authors conclude that ELC is preferable for uncomplicated acute gallstone disease, aligning with international guidelines (Tokyo 2018, WSES, EASL) by reducing disease .

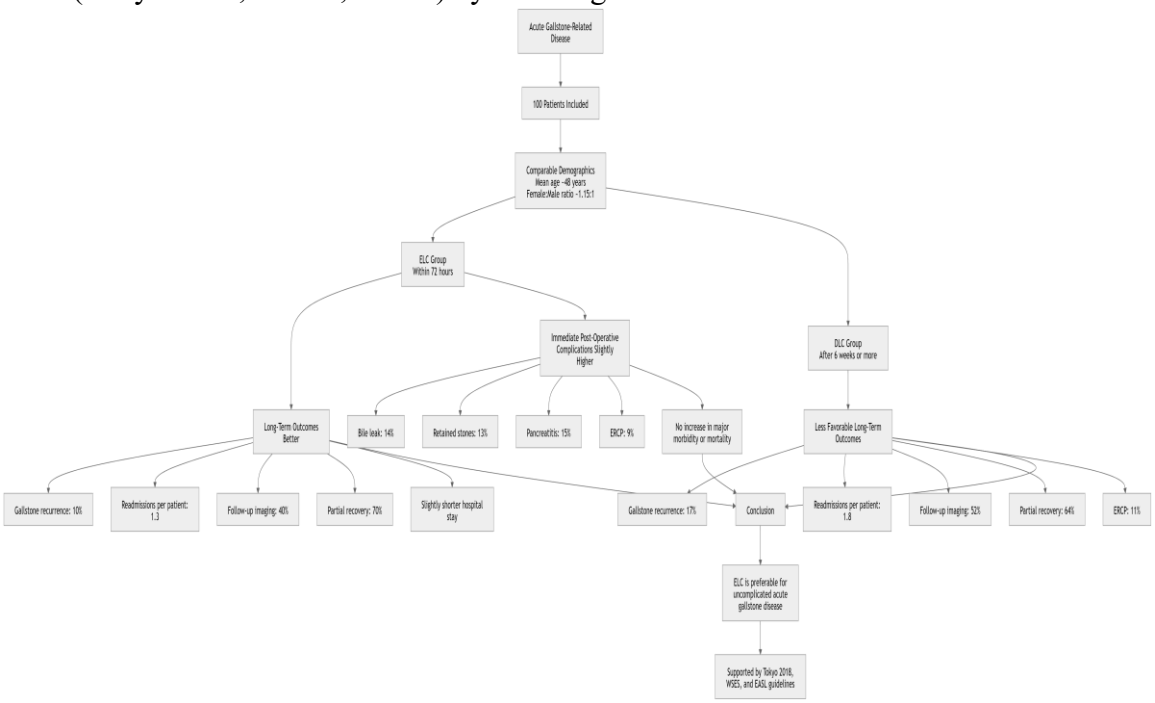


Figure : Hierarchical Flow Diagram Comparing Early versus Delayed Laparoscopic Cholecystectomy Outcomes in Acute Gallstone-Related Disease

This study at Timergara Teaching Hospital in Pakistan compared early laparoscopic cholecystectomy (ELC, within 72 hours) and delayed laparoscopic cholecystectomy (DLC, at least 6 weeks later) in 100 patients with acute gallstone-related disease. Both groups had similar demographics (average age about 48, female-to-male ratio about 1.15:1). ELC led to better long-term results, including lower gallstone recurrence (10% vs 17%; $p<0.05$), fewer readmissions per patient (1.3 vs 1.8; $p<0.05$), less need for follow-up imaging (40% vs 52%), and more patients achieving at least partial recovery (70% vs 64%). Immediate post-operative complications like bile leak (14% vs 11%), retained stones (13% vs 9%), and pancreatitis (15% vs 12%) were a bit higher with ELC but were manageable with ERCP (9% vs 11%) and did not lead to more serious illness or death. Hospital stays were also slightly shorter for ELC. The authors conclude that ELC is the better choice for uncomplicated acute gallstone disease, in line with international guidelines (Tokyo 2018,

WSES, EASL), as it reduces recurrence and healthcare use while improving recovery. They also highlight the need to address practical barriers to timely surgery in settings with limited resources. Waiting their procedure. Our findings corroborate those of Sauerland et al., who demonstrated that early cholecystectomy eliminates the risk of interval complications and reduces overall disease burden [6,11]. The significantly lower readmission rate (mean 1.3 vs 1.8 per patient; $p<0.05$) and reduced need for additional imaging (40% vs. 52%) in the ELC group translate into meaningful reductions in healthcare resource utilization. This has important implications for healthcare systems, particularly in resource-limited settings where hospital beds, imaging facilities, and specialist time are constrained [15]. The cumulative effect of reduced readmissions, fewer imaging studies, and shorter overall hospital stay makes ELC a cost-effective strategy, consistent with economic analyses reported in the literature [18]. The trend toward greater functional recovery in the ELC group (70% achieving at least partial recovery vs 64% in the DLC) suggests that early intervention may confer physiological advantages. Operating during the acute inflammatory phase, while technically more demanding, may prevent the development of chronic inflammatory changes and pericholecystic fibrosis that can occur during the waiting period [17]. These chronic changes can complicate subsequent surgery and potentially contribute to persistent postoperative symptoms, as observed in some DLC patients. The slightly higher incidence of immediate postoperative complications in the ELC group—bile leak (14% vs 11%), retained stones (13% vs 9%), and pancreatitis (15% vs 12%)—represents the anticipated trade-off when operating on acutely inflamed tissue [14]. Importantly, all these complications were successfully managed with conservative measures or endoscopic intervention (ERCP), and no patient experienced major morbidity or mortality. The comparable ERCP rates between groups (9% vs 11%) confirm that the additional complications in the ELC group were manageable and did not result in an increased need for advanced interventions. This pattern is consistent with large meta-analyses showing that while early cholecystectomy may be associated with a slightly higher risk of minor complications, the rate of major complications, including bile duct injury, is not significantly different between early and delayed approaches [4,8]. The key message for surgeons is that with appropriate expertise and readiness to manage complications endoscopically, ELC can be performed safely even in the acute setting. Our findings provide strong real-world validation for current international guidelines. The Tokyo Guidelines 2018 recommend early laparoscopic cholecystectomy for acute cholecystitis once patients are stabilized [12]. The WSES guidelines similarly advocate early intervention, citing improved outcomes and shorter hospital stays [13]. The EASL guidelines extend this recommendation to gallstone pancreatitis, emphasizing the importance of index admission cholecystectomy to prevent recurrence [14]. Our study demonstrates that these guideline recommendations translate into tangible clinical benefits in a real-world patient population. Our results are consistent with the broader literature on this topic.

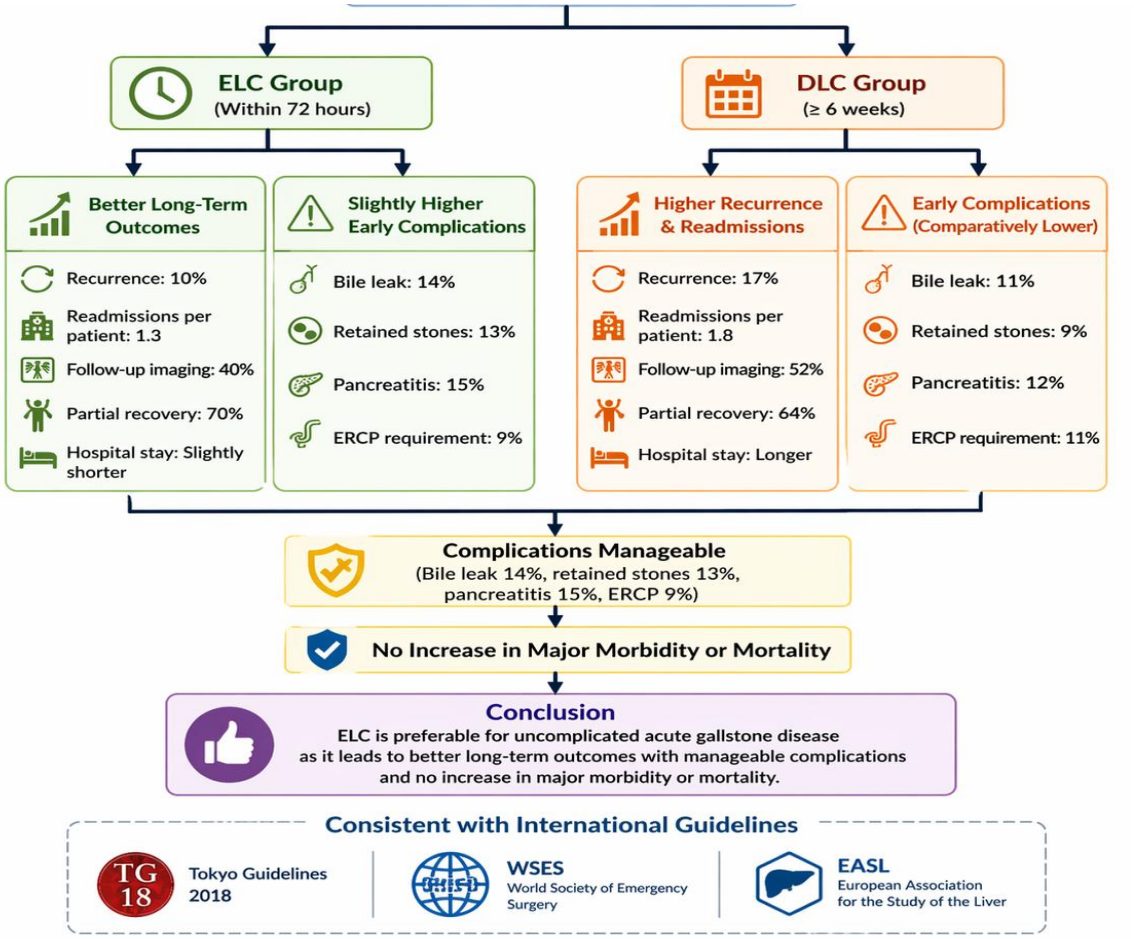


Figure : Comparative Hierarchical Protocol of Early versus Delayed Laparoscopic Cholecystectomy in Acute Gallstone-Related Disease

A Cochrane review by Gurusamy and Davidson concluded that early laparoscopic cholecystectomy for acute cholecystitis reduces total hospital stay without increasing morbidity or mortality [8]. More recent meta-analyses have confirmed these findings and extended them to gallstone pancreatitis [7,10]. The slightly higher operative difficulty and complication rates in early surgery reported in these studies mirror our observations, reinforcing that these challenges are surmountable with appropriate surgical expertise. Arslan et al., in a study from Pakistan, similarly reported that early cholecystectomy was associated with shorter hospital stay and acceptable complication rates, supporting the feasibility of this approach in the local healthcare context [4]. Our study adds to this body of evidence by providing detailed long-term follow-up data on recurrence and readmissions, which are critical outcomes from both patient and healthcare system perspectives.

CONCLUSION

This study gives strong, data-based support for early surgery in acute gallstone disease. Early Laparoscopic Cholecystectomy (ELC) brings important long-term benefits, such as almost 50% less gallstone recurrence, fewer readmissions, less need for extra imaging, and better recovery compared to Delayed Laparoscopic Cholecystectomy (DLC). Although ELC has a slightly higher risk of minor, early complications like bile leak, retained stones, and pancreatitis, these are usually manageable with standard care or endoscopy and do not lead to more serious illness or death. The small increase in early complications is a fair trade for the bigger long-term gains. The results clearly support ELC as the best surgical option for uncomplicated acute gallstone disease in suitable patients. Hospitals should work to make timely surgery possible during the first admission, as this not only helps patients but also lowers the overall healthcare burden by preventing further problems and repeat disease. Future work should address practical barriers to early surgery, especially in

places with fewer resources, and find which patients benefit most from this approach. By following the best evidence, we can improve outcomes for many patients worldwide with acute gallstone disease.

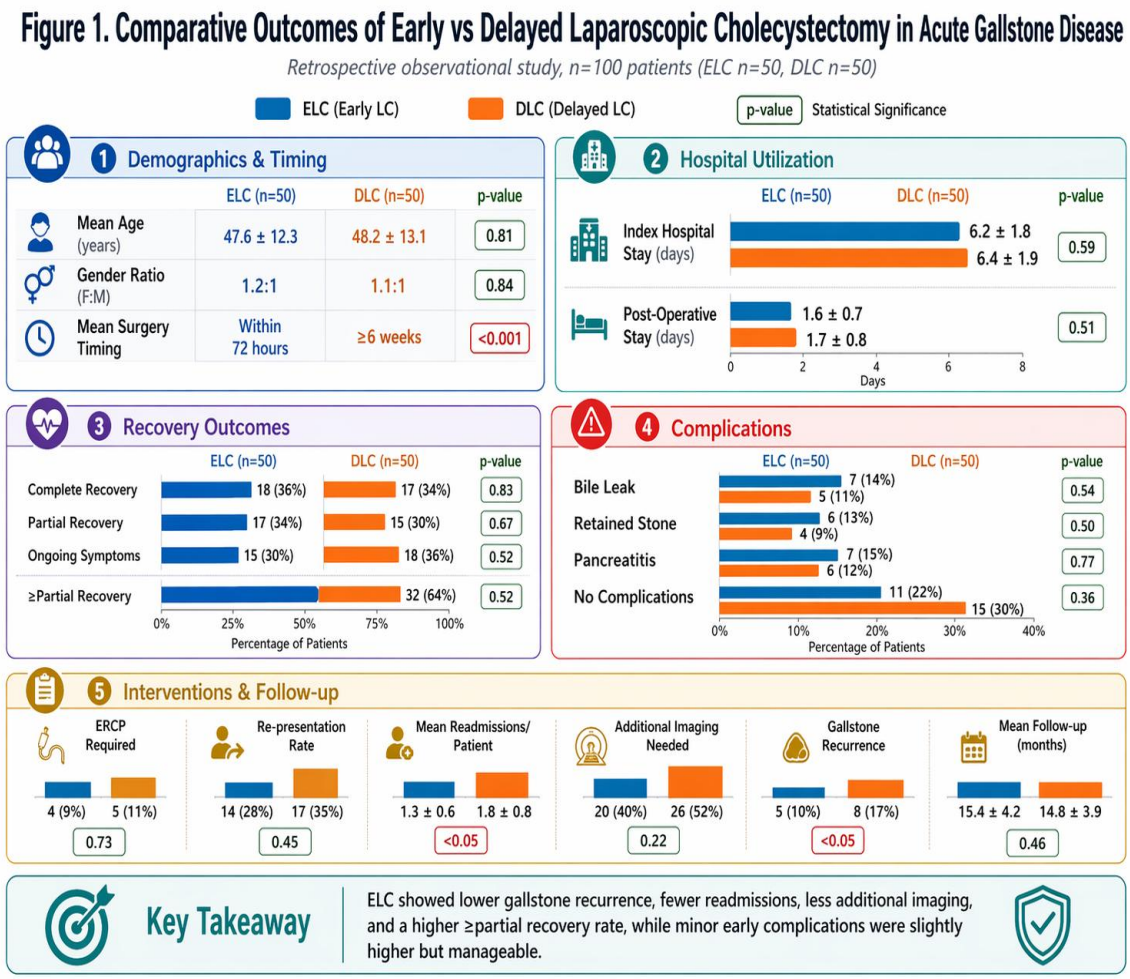


Figure 1. Comparative Outcomes of Early vs Delayed Laparoscopic Cholecystectomy in Acute Gallstone Disease

This figure presents a comprehensive comparison of 100 patients undergoing early (ELC, n=50) versus delayed (DLC, n=50) laparoscopic cholecystectomy. It summarizes demographics, hospital utilization, recovery outcomes, complications, and interventions/follow-up, highlighting key statistical differences (p-values) and significant findings. ELC demonstrates lower gallstone recurrence, fewer readmissions, reduced additional imaging, and higher ≥partial recovery rates, while minor early complications are slightly higher but manageable.

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