

**ACUTE CHOLECYSTECTOMY: OPTIMAL TIMING OF SURGERY FOR
ACUTE CHOLECYSTITIS (EARLY VS DELAYED OPERATION)**

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Annotation: *The article provides a comparative analysis of outcomes between early and delayed cholecystectomy for acute cholecystitis. Pathophysiological aspects of the gallbladder inflammatory process determining surgical strategy across different time windows from symptom onset are reviewed. Key clinical outcomes, including conversion rates to open surgery, total length of hospital stay, postoperative complication rates (including bile duct injury), and cost-effectiveness, are analyzed. Based on modern international guidelines (Tokyo Guidelines 2018), the advantages of early laparoscopic cholecystectomy as the gold standard of treatment are substantiated.*

Key words: acute cholecystitis, early cholecystectomy, delayed cholecystectomy, Tokyo Guidelines, laparoscopy, conversion rate, bile duct injury.

Acute cholecystitis (AC) remains one of the most common causes of emergency surgical admissions globally. While laparoscopic cholecystectomy (LC) is universally accepted as the definitive treatment for AC, the optimal timing of the surgical intervention has been a subject of intense debate for decades. Traditionally, a delayed approach involving initial conservative antibiotic management followed by elective surgery 6–12 weeks later was preferred to allow acute inflammation to subside. However, with advancements in laparoscopic technique, perioperative monitoring, and a growing body of high-quality randomized controlled trials (RCTs), the paradigm has decisively shifted toward early surgical intervention.

Pathophysiological Rationale and Timeline Boundaries

The surgical landscape in acute cholecystitis is strictly dictated by the evolution of tissue pathology over time. The inflammatory process in AC can be broadly divided into three phases, which explain the clinical differences between early and delayed operations:

1. **The "Golden Window" (First 72 Hours):** During the initial 3 days of symptom onset, the gallbladder wall undergoes acute edematous inflammation. Tissues are

characterized by interstitial edema and hypervascularity, which paradoxically facilitates the dissection of anatomical structures (such as Calot's triangle) as tissue planes are easily separated by hydraulic fluid pressure.

2. **The Subacute Phase (Days 4 to 10):** Beyond 72 hours, edema transitions into dense cellular infiltration, fibroblastic proliferation, and subsequent organization of tough, friable adhesions. Neovascularization and tissue necrosis significantly obscure the anatomical structures, markedly increasing the risk of structural injury and uncontrollable parenchymal bleeding during dissection.
3. **The Chronic Phase (Beyond 6 Weeks):** If left to resolve under conservative therapy, the acute inflammatory response subsides, leaving behind organized fibrotic scar tissue. While anatomy becomes stable again, up to 20–30% of patients fail conservative therapy or suffer recurrent biliary events during this waiting period.

Comparative Clinical Outcomes: Early vs. Delayed Cholecystectomy

Outcome Measure	Early Cholecystectomy (Within 72h–7 days)	Laparoscopic Cholecystectomy (ELC) (Interval surgery at 6–12 weeks)	Delayed Laparoscopic Cholecystectomy (DLC) (Interval surgery at 6–12 weeks)
Total Length of Hospital Stay (LOS)	Significantly shorter (consolidates diagnostic, pre-op, and post-op days into a single admission)	Significantly longer (requires cumulative days from separate admissions)	
Conversion Rate to Open Surgery	Equivalent or lower (when performed within the early edematous window)	Varies; can be elevated if interval fibrosis is dense or if ELC is attempted late in the subacute phase	
Bile Duct Injury (BDI) Rates	Comparable statistically difference compared to elective interval surgery	(no significant acute BDI risk peaks if surgery is inappropriately delayed into the subacute phase)	Comparable; however, BDI risk peaks if surgery is inappropriately delayed into the subacute phase

Overall Complication Rate	Lower morbidity	Higher cumulative morbidity due to gallstone-related recurrences during the waiting period
Economic Cost	Highly cost-effective (reduces work absenteeism due to dual admissions and total hospital resource potential utilization)	Higher financial burden emergency readmissions

Therapeutic Stratification via Tokyo Guidelines 2018 (TG18)

Modern surgical management relies on the severity stratification outlined by the Tokyo Guidelines 2018 (TG18):

- **TG18 Grade I (Mild AC):** Early LC is strongly recommended as the first-line treatment. Surgery should ideally be performed within 72 hours of symptom onset but remains feasible and beneficial up to 7 days.
- **TG18 Grade II (Moderate AC):** Characterized by profound local inflammation (e.g., palpable mass, gangrenous or emphysematous cholecystitis, duration >72 hours). Early LC is preferred at advanced laparoscopic centers. If severe local inflammation renders dissection hazardous, subtotal cholecystectomy or early percutaneous transhepatic gallbladder drainage (PTGBD) are viable strategies.
- **TG18 Grade III (Severe AC):** Accompanied by organ dysfunction (cardiovascular, neurological, respiratory, renal, hepatic, or hematological). Initial management mandates organ support and urgent **percutaneous gallbladder drainage (PTGBD)** to control sepsis, followed by delayed elective cholecystectomy once the patient's systemic status stabilizes.

Conclusion

Current clinical evidence and consensus guidelines firmly establish early laparoscopic cholecystectomy as the superior approach for Grade I and Grade II acute cholecystitis. Performing the operation within the early edematous window (ideally <72 hours from symptom onset) optimizes surgical field visualization, reduces hospital stay, prevents the morbidity associated with failed conservative therapy, and minimizes the overall socioeconomic burden of biliary disease. Delayed interval surgery should

be reserved primarily for patients presenting with severe organ dysfunction or those with significant comorbidities prohibiting safe emergency anesthesia.

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