

Laparoscopic Cholecystectomy for Acute Cholecystitis: An Evidence-Based Review

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ABSTRACT

Laparoscopic cholecystectomy (LC) is currently considered the standard treatment for acute cholecystitis, although controversies persist regarding optimal timing, management of severe disease, and treatment in high-risk populations. This review summarizes current evidence on the effectiveness, safety, and indications of LC compared with open surgery and percutaneous drainage. Available data consistently demonstrate that LC is associated with lower morbidity, mortality, and shorter hospital stay compared with open cholecystectomy. Early LC is generally favored, as it reduces complications and overall hospitalization. However, in severe inflammation or high-risk patients, complication rates and conversion to open surgery increase, and alternative strategies such as percutaneous cholecystostomy may be appropriate. Outcomes are strongly influenced by surgical expertise and patient selection. Overall, LC remains the preferred treatment for most patients with acute cholecystitis, provided that appropriate clinical judgment and bailout strategies are applied in complex cases.

KEYWORDS: Laparoscopic cholecystectomy; Acute cholecystitis; Early surgery; Percutaneous cholecystostomy; Surgical outcomes; Minimally invasive surgery; Biliary disease.

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INTRODUCTION

Acute cholecystitis is one of the most common surgical emergencies worldwide. Over the past decades, laparoscopic cholecystectomy has replaced open surgery as the preferred treatment due to its minimally invasive nature and improved postoperative outcomes (1).

Despite its widespread adoption, several aspects remain debated, including the optimal timing of surgery, management of severe inflammation, and treatment strategies in elderly or high-risk patients. Additionally, the role of alternative approaches such as percutaneous cholecystostomy continues to be explored in specific clinical scenarios (2).

This review provides a concise and evidence-based overview of laparoscopic cholecystectomy in acute cholecystitis, focusing on outcomes, timing, safety, and patient selection.

Literature Review

Laparoscopic vs Open Cholecystectomy

Multiple systematic reviews and meta-analyses have demonstrated that laparoscopic cholecystectomy offers

significant advantages over open surgery in patients with acute cholecystitis. These benefits include lower postoperative morbidity, reduced mortality, fewer wound infections, and shorter hospital stay (1–4).

Importantly, rates of major complications such as bile duct injury or significant hemorrhage appear to be similar between both approaches, supporting the safety of laparoscopic techniques when performed by experienced surgeons (1,4).

Laparoscopic Cholecystectomy vs Percutaneous Cholecystostomy

In high-risk patients, percutaneous cholecystostomy has been proposed as an alternative to surgery. However, recent systematic reviews indicate that cholecystectomy is associated with lower mortality and fewer readmissions compared with percutaneous drainage (5,6).

Therefore, laparoscopic cholecystectomy remains the preferred treatment in most patients, while percutaneous cholecystostomy should be reserved for those who are not

Laparoscopic Cholecystectomy for Acute Cholecystitis: An Evidence-Based Review

suitable surgical candidates due to severe comorbidities or critical illness (5).

Table 1. Comparison of Treatment Strategies in Acute Cholecystitis

Comparison Advantages of LC		Limitations / Considerations
LC vs Open	Lower mortality, fewer complications, shorter hospital stay	Similar risk of bile duct injury and bleeding
LC vs PC	Lower mortality, fewer readmissions	PC useful in high-risk or unfit patients

Timing of Surgery: Early vs Delayed LC

The timing of laparoscopic cholecystectomy has been extensively studied. Evidence consistently supports early LC, typically performed within 72 hours of diagnosis or up to 7–10 days from symptom onset (7,8).

Meta-analyses have shown that early LC is associated with fewer postoperative complications, reduced conversion rates, and shorter overall hospital stay compared with delayed surgery (9). Additionally, early intervention avoids recurrent symptoms and repeated hospital admissions. Severe Acute Cholecystitis



Figure 1. Gallbladder with thickened walls and abundant stones inside

In severe forms of acute cholecystitis, including gangrenous or empyematous disease, laparoscopic cholecystectomy is technically more challenging. These cases are associated with

higher rates of conversion to open surgery and increased complication rates (10).

Laparoscopic Cholecystectomy for Acute Cholecystitis: An Evidence-Based Review

However, outcomes remain acceptable when surgeons adopt a low threshold for conversion or employ bailout strategies such as subtotal cholecystectomy or drainage in difficult cases (11).

Safety and Outcomes in Special Populations

Several studies have evaluated the safety of laparoscopic cholecystectomy in elderly patients. Although complication rates increase with age and comorbidities, LC is still associated with better outcomes compared with open surgery, including shorter hospital stay and fewer cardiopulmonary complications (12).

Overall, conversion rates in routine practice remain relatively low, typically around 2–3%, and most complications are manageable when procedures are performed by experienced surgical teams (11,13).

When Laparoscopic Cholecystectomy May Not Be Ideal

In patients with very high surgical risk, such as those with severe comorbidities or high anesthetic risk, percutaneous cholecystostomy may be used as a bridge to surgery or as definitive treatment (5,6).

Additionally, some observational data suggest that laparoscopic cholecystectomy may be associated with higher rates of bile duct injury in complex cases, emphasizing the importance of careful patient selection and surgical expertise (14).

DISCUSSION

The current body of evidence strongly supports laparoscopic cholecystectomy as the standard treatment for acute cholecystitis. Its advantages over open surgery are well established, particularly in terms of reduced morbidity and faster recovery.

Timing appears to be a critical factor, with early surgery consistently demonstrating better outcomes. However, clinical judgment remains essential, especially in patients with severe inflammation or significant comorbidities.

Another key consideration is the role of surgical expertise. Many of the benefits associated with laparoscopic cholecystectomy depend on the surgeon's experience and the ability to recognize hazardous anatomy and apply appropriate bailout strategies.

Finally, while percutaneous cholecystostomy plays a role in high-risk patients, it should not replace surgery in patients who are suitable candidates for laparoscopic intervention.

CONCLUSION

Laparoscopic cholecystectomy is a safe and effective treatment for acute cholecystitis and remains the preferred approach in most patients. Early intervention provides the best outcomes, reducing complications and hospital stay. Nevertheless, management should be individualized, particularly in severe cases and high-risk populations. The use of bailout strategies and alternative treatments such as percutaneous cholecystostomy is essential for optimizing outcomes in complex scenarios.

Successful management ultimately depends on appropriate patient selection, surgical expertise, and adherence to evidence-based principles.

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