

OPEN VERSUS LAPAROSCOPIC CHOLECYSTECTOMY IN ACUTE CHOLECYSTITIS: A SYSTEMATIC REVIEW

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Abstract

Background: Acute cholecystitis is an inflammatory disease caused by gallstones that can range from mild to severe, with septic sepsis as a complication. It is the sixth most prevalent gastrointestinal disorder and is responsible for 0.2% to 0.5% of all fatalities. 16% of men and 50% of women in their 70s have gallbladder disease, which is a risk factor. Various treatment modalities, such as open or laparoscopic cholecystectomy, are available.

Aim: The purpose of this review is to compare the advantages and disadvantages of open cholecystectomy and laparoscopic cholecystectomy in the acute management of cholestitis.

Methods: We conducted a comprehensive search of multiple electronic reference databases (PubMed, ScienceDirect, Web of Science, and Cochrane). The inclusion criteria were English-language articles with full-text availability and articles published between 2018 and 2023. The studies analyzed complications and a variety of other parameters to determine the benefits and drawbacks of each method.

Results : A total of 5 studies were included. Various complications can be used as parameters to determine the superiority of each method. Four out of 5 studies found that laparoscopic was superior to open cholecystectomy. The hospitalization time of laparoscopic patients was lower (LC 1.67±0.9 days; OC 3.2±1.8) with a lower amount of bleeding during surgery >100 ml compared to open laparoscopic (Intra operative bleeding (OC (n=8) vs LC (n=0)).

Conclusion: Considering the advantages and disadvantages of the described complication parameters, laparoscopic procedures are superior and preferable to the use of open cholestectomy in cases of acute cholestitis.

Keywords: Acute colesystitis; comparative; laparoscopic; open cholestectomy.

INTRODUCTION

Gallstones are the most prevalent cause of acute cholecystitis. The severity of acute cholecystitis ranges from relatively mild to severe, with septic sepsis as a complication. It is the sixth most prevalent gastrointestinal illness seen in emergency situations. It accounts for 0.2% to 0.5% of fatalities.¹ Age is a risk factor for this condition, as aging increases the number of patients with multiple comorbidities. 16% of men and 50% of women over the age of 70 suffer from gallbladder disease.² Acute cholecystitis is typically more progressive and severe in people over 65 than in younger patients.²

Acute cholecystitis, the most common complication of gallstones, is a gallbladder inflammation requiring emergency hospitalization and treatment. Acute cholecystitis is characterized clinically by a more than 24-hour episode of acute biliary pain, fever, and right hypochondriac pain. It is typically caused by gallstones that remain lodged in the gallbladder lobe. 20 to 40% of people with gallstones will experience symptoms, and 12% will develop cholecystitis.³

This disease requires early surgery, and laparoscopy should be compared to open surgery in terms of technical considerations. Laparoscopic cholecystectomy (LC) has become the preferred procedure for elective cholecystectomy; however, approximately 48.7% of acute cholecystitis is still treated with open techniques. We are not aware of any comparative meta-analyses of these AC techniques. Some authors consider inflammation, edema, and necrosis to be undesirable surgical conditions. Consequently, many surgeons in the era of laparoscopy deferred cholecystectomy after the resolution of acute inflammation due to the presumption of an increased risk of complications⁴

A new edition of the Tokyo Guidelines (TG 2013) was published in 2013 to determine the optimal surgical treatment for acute cholecystitis based on severity, timing, and procedure. Mild, moderate, and severe classifications of acute cholecystitis are primarily based on the degree of gallbladder inflammation rather than the patient's condition.^{5,6}

Initial standard treatment for acute cholecystitis includes gastrointestinal relaxation, intravenous hydration, correction of electrolyte abnormalities, analgesia, and intravenous antibiotics, followed by an open or laparoscopic cholecystectomy.⁷ The disease is characterized by upper abdominal pain on the right side, nausea, vomiting, and occasionally fever. Typically, biliary colic precedes acute cholecystitis, and cholecystitis episodes frequently recur in the absence of appropriate treatment. Cholecystitis is diagnosed by observing symptoms and conducting laboratory tests. In most cases, abdominal ultrasound is utilized to confirm the diagnosis.⁷

Due to the high rate of recurrence and incidence of gallstone complications following hospitalization for an acute attack of cholecystitis, it is crucial to conduct gallbladder removal surgery with an early or elective approach. In acute cholecystitis, laparoscopic cholecystectomy and open cholecystectomy are surgical options. Laparoscopic cholecystectomy has surpassed open cholecystectomy as the preferable method for cholecystectomy.^{8,9}

Prior to 1991, the standard procedure for cholecystectomy was the open method. However, current research indicates that laparoscopic cholecystectomy is the most common surgical treatment for acute cholecystitis.^{11,12} There are no additional studies that compare open cholecystectomy and laparoscopic cholecystectomy in terms of complications, duration of hospital stay, disadvantages, and advantages. Consequently, the purpose of this review is to compare the advantages and disadvantages of open cholecystectomy and laparoscopic cholecystectomy in the acute management of cholestitis.

MATERIAL AND METHODS

a. Eligibility criteria

These are the inclusion criteria for these studies:

- Published in English and available in its entirety.
- To be released between 2018 and 2023.
- The studies were cohort, case-control, case-series, cross-sectional, and randomized controlled trial (RCT) designs.
- Articles discussing laparoscopic and open cholecystectomy for acute cholecystitis were used in the studies.
- The studies evaluated the outcomes regarding complications, duration of hospitalization, disadvantages, and benefits associated with the use of each treatment technique for acute cholecystitis.

b. Guidelines

We used the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guideline to perform the reporting of this study. We can find 5 appropriate studies included in the review, as shown in the flow diagram in Figure 1.

c. Search strategy

Investigators independently conducted a literature search on August 13, 2023 for relevant articles available in several databases (PubMed, ScienceDirect, Web of Science and the Cochrane Central Register of Controlled Trials (CENTRAL)) following PRISMA guidelines. The following keywords were used: ((Open) OR (Laparoscopic) OR ((Open cholecystectomy) OR (Laparoscopic cholecystectomy))) AND (Acute Cholecystitis) AND ((Complication) OR (Length of hospital day) OR (bleeding) OR (Mortality) OR (Morbidity)). A manual search was also conducted to obtain relevant articles fulfilling the criteria mentioned.

d. Data extraction and quality assessment

Data were extracted based on author, year, study design, sample size, result and disucssion. The key outcome measure was the complication, length of hospital day, disavantage and benefit.

RESULTS

Study characteristics

In this systematic review, we found a total of five studies, with comparative prospective study types. A total of 1736 patients were involved in this study. All of these studies discussed the use of operative methods in acute cholecystitis using open vs laparoscopic. Studies were from several countries such as India, Phoenix, Egypt. From 20 to 80 years of age. Various parameters, including postoperative complications, duration of hospitalization, amount of bleeding, incidence of wound infection, morbidity, and mortality, were reportedly observed.

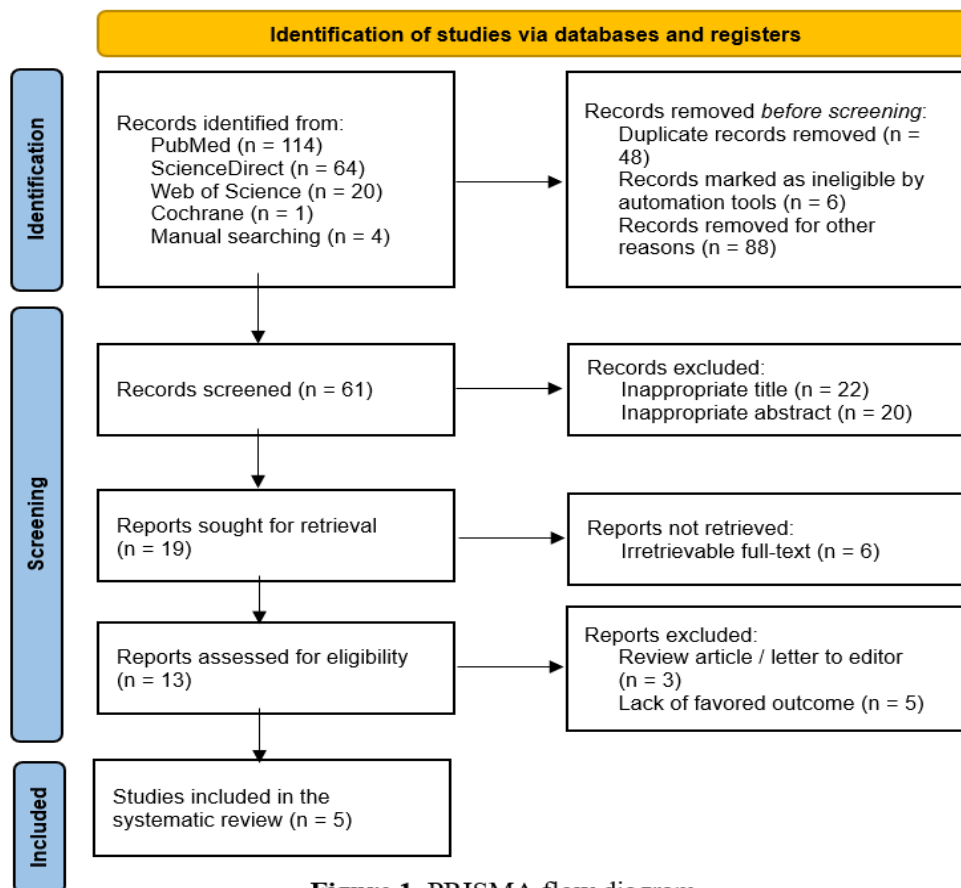


Figure 1. PRISMA flow diagram

Table 1. Characteristic of the study

No	Author	Study Design	Sample size	Age	Results	Discussion
1.	Pateriya, et al., 2021 ¹⁰	Comparative prospective randomized study model	100	45.21±14.6 years	Post operative complications Bleeding (OC n=8 vs LC=0) Infection ((OC (n=9) vs LC (n=0)) Jaundice ((OC (n=18) vs LC (n=4)) Distension ((OC (n=37) vs LC (n=12)) Nausea ((OC (n=42) vs LC(n=32)) Mean duration of surgery ((OC (n=86.8 minutes) vs LC (n=66.3 minutes)) Avarage blood loss over 100 ml (OC (n=31) vs LC (n=6))	In cases of open cholecystectomy, the incidence of post-operative complications and length of hospital stay were greater, according to the study.
2.	Mohaved, et al 2023 ¹¹	Comparative study	NR	OC (60.96±16.25) LC (61.91±19.21)	Patients with open surgery STEMI have a 3 x risk of STEMI with 9 x mortality.	Open cholecystectomy is associated with significantly higher rates of STEMI, Non-STEMI, and mortality compared to laparoscopic surgery.
3	Atrash, et al.,	Prospective clinical trial	30	LC (50.47±8.2) OC (52 ±6.1)	Hospital stay (LC 1.67±0.9; OC 3.2±1.8)	In the first week of acute cholecystitis, laparoscopic

No	Author	Study Design	Sample size	Age	Results	Discussion
	2020 ¹²				Wound infection (LC 6,7%; OC 40%) Intestinal injury (LC 0; OC 26,7%)	cholecystectomy should be attempted if there are no complications such as gangrenous gall bladder. Laparoscopic cholecystectomy decreases postoperative morbidity and length of hospital stay. Laparoscopy also reduces intestinal injury and wound infection rates. There is a positive trend in operating time favoring laparoscopy, but additional research is required. The technique has no effect on the incidence of severe hemorrhage or bile leakage.
4.	Ranjan, et al., 2018 ¹³	Prospective randomized study of 120 patient of cholithiasis	120	20-80 years	Wound infection (LC 5 vs OC 11) Intra operative bleeding (LC 3 vs OC 2) Abdominal infection (LC 0 vs OC 3) Postoperative ileus (LC 3 vs OC 6) Operation time (LC 55-155 minutes vs OC 40-105 minutes)	Open cholecystectomy is inferior to laparoscopic cholecystectomy. However, open cholecystectomy is preferred in cases of cholecystectomies that are complicated.
5.	Abdelhamid, et al., 2019 ¹⁴	Prospective study	1486	52 ±9,6 years	Postoperative jaundice (LC 0,35% vs OC 0%) Morbidity (LC 1,4% vs OC 0,3%) Mortality (LV 0,08% vs 0,3%)	Laparoscopic interventions have a higher injury rate, and the proximal ducts are at increased risk.

OC= Open cholecystectomy; LC=Laparoscopic cholecystectomy

Discussion

There are a total of 5 studies that discuss the comparative use of open cholecystectomy and laparoscopic methods. Some of the parameters used to determine which is superior are the comparison of length of hospitalization, operating time, complications that arise such as wound infection, and the amount of bleeding.

According by Pateriya, et al.,¹⁰ The present investigation was conducted with a predominantly male sample size of 100 participants. Throughout the duration of the investigation, female participation in outpatient wards was reduced among the authors. The average age of the subjects was 45.21 years. In the LC group, the average duration of surgery was 86,8 minutes, while the average duration of open surgery was 66,3 minutes. Statistically, this difference was significant. The study shows a lower time in OC cases and is similar to studies by Shukla et al¹⁵ In instances where the authors reported a shorter duration, the difference in duration was regarded variable. This distinction is attributable to surgeon skill and anesthetic requirements. Nevertheless, all instances of OC are characterized by a relatively brief duration. In the OC group, the average blood loss was greater, with 31 subjects reporting a loss of more than 100 ml versus only 6 in the LC group. This corresponds to the findings of Shukla et al., Sheikh et al., and Poggio et al. In their research, the authors noted a reduction in blood loss. This is because laparoscopy, as a minimally invasive procedure, is likely to result in less blood loss.¹⁶

Studi oleh Atrash, et al.,¹² In In this analysis, the most prevalent symptoms in both groups were abdominal pain, fever, nausea/anorexia, and vomiting. It is presumed that the primary advantages of LC consist of less postoperative pain, a reduced operation time, a lower incidence of postoperative complications, and early ambulation leading to a shorter hospital stay. We found a statistically significant correlation (p = 0.021) between procedure type and length of hospital stay in this study. Patients in the LC group had hospital stays that were significantly shorter.

Abdelhalim et al.'s study is distinct from the other four studies. Morbidity was statistically (0.01) significantly higher with laparoscopic intervention, while mortality was statistically significantly higher with open surgery. The study failed to provide an explanation for why its results differed from those of similar studies.¹⁷

Prior to 1991, the standard procedure for cholecystectomy was the open method. However, current studies indicate that laparoscopic cholecystectomy is the most common surgical procedure for treating acute cholecystitis in patients of all ages, with superior outcomes.¹⁸ This is because laparoscopic cholecystectomy is an uncomplicated procedure that requires less time, has a low rate of complications, and results in a shorter hospital stay and earlier return to work than open cholecystectomy. Laparoscopic cholecystectomy is therefore preferable to open cholecystectomy for patients requiring gallbladder excision.¹⁹

Currently, 92% of all cholecystectomies are performed laparoscopically, though open cholecystectomies are more prevalent in many underprivileged contexts.²⁰ Laparoscopic cholecystectomy has diminished the need for open cholecystectomy. Only when laparoscopic cholecystectomy must be converted to open cholecystectomy is open cholecystectomy performed between 2% and 10% of the time.²⁰

In the mid-1990s, laparoscopic cholecystectomy had replaced open cholecystectomy as the standard treatment for gallstones. Multiple studies have demonstrated that laparoscopic cholecystectomy reduces a variety of complications and side effects, including postoperative incision infection, bile leakage rate, postoperative pain intensity, analgesic requirement, duration of postoperative NPO status, and surgical duration. Laparoscopic cholecystectomy is a more effective treatment with fewer complications for acute cholecystitis when compared to open cholecystectomy.^{21,22} Laparoscopic cholecystectomy may be difficult to perform in some patients due to complicated surgery; extreme inflammation; unclear anatomy; variations in bile duct anatomy, with irregular intraoperative laparoscopic cholangiography, complications including bleeding, duodenal damage, and respiratory acidosis; or other causes, including failure to protect the cystic duct, equipment problems, and unexpected pathology.²³

During laparoscopic cholecystectomy, complications related to anesthesia, pneumoperitoneum, intra-operative bleeding, bile duct injury, extreme inflammation of the callot triangle, difficult dissection, and certain pathologies, such as mirrizzi syndrome type 3 causing dissection difficulty in inexperienced hands, as well as a number of other factors, may necessitate conversion from laparoscopic to open cholecystectomy. A study from one medical center revealed a conversion rate of 2.6%, and among the converted cases, acute cholecystitis was the most prevalent diagnosis. The surgeon's learning trajectory is directly proportional to the success rate of laparoscopic procedures. Laparoscopic procedures typically cost more and require more specialized training and experience than open procedures.^{23,24}

Conclusion

Considering the advantages and disadvantages of the described complication parameters, laparoscopic procedures are superior and preferable to the use of open cholecystectomy in cases of acute cholecystitis.

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