

A Retrospective Comparative Study of Laparoscopic Versus Open Cholecystectomy in Acute Cholecystitis

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Abstract:

Background: Acute cholecystitis is a common surgical emergency usually caused by gallstone obstruction of the cystic duct. With advancements in minimally invasive surgery, laparoscopic cholecystectomy has increasingly replaced open cholecystectomy for the management of acute cholecystitis due to improved postoperative outcomes and faster recovery.

Aim: Comparing the surgical outcomes of laparoscopic cholecystectomy and open cholecystectomy in patients with acute cholecystitis.

Methodology: This retrospective comparative study was conducted in the Department of General Surgery, Anugrah Narayan Magadh Medical College and Hospital over a duration of 10 months from May 2025 to February 2026. A total of 120 patients diagnosed with acute cholecystitis and treated surgically were included in the study. Clinical records were analyzed regarding demographic profile, operative findings, postoperative complications, duration of hospital stay, and recovery outcomes.

Results: Laparoscopic cholecystectomy was performed in many patients and was associated with shorter operative time, reduced postoperative complications, shorter hospital stay, and faster recovery compared to open cholecystectomy. Wound infection and respiratory complications were more common in open surgery, while conversion to open procedure was required in a few difficult laparoscopic cases.

Conclusion: Laparoscopic cholecystectomy is a safe and effective procedure with better postoperative outcomes and reduced morbidity compared to open cholecystectomy in acute cholecystitis.

Keywords: Acute Cholecystitis, Laparoscopic Cholecystectomy, Open Cholecystectomy, Gallstone Disease, Surgical Outcomes, Retrospective Study.

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Introduction

Acute cholecystitis (AC) is among the commonest surgical emergencies seen in general surgical practice. This is usually caused by gallstones blocking the cystic duct which causes inflammation and swelling of the gallbladder and sometimes bacterial infection as well. Gallstones is one of the most common gastrointestinal diseases affecting nearly 10% of the western population and about 1–3% of symptomatic patients progress to acute cholecystitis [1]. Acute cholecystitis is typically manifested by severe pain in the right upper quadrant, fever, nausea, vomiting and tenderness in the right hypochondrium. If untreated properly, the disease may progress to gangrene, perforation, empyema or sepsis, thus increasing patient morbidity and mortality [2].

The diagnosis of acute cholecystitis is based primarily on clinical, laboratory, and radiologic findings. Ultrasonography of the abdomen remains the primary diagnostic modality due to its high sensitivity and specificity in detecting gallstones, thickening of the gallbladder wall, pericholecystic fluid collection and sonographic Murphy's sign. In doubtful cases or to identify complications other imaging techniques such as computed tomography (CT scan) and hepatobiliary iminodiacetic acid (HIDA) scan may be used [3].

Conservative and surgical treatment of acute cholecystitis is presented. Conservative treatment includes IV fluids, antibiotics, analgesics, bowel rest and supportive care. Definitive treatment is surgical

removal of gallbladder (cholecystectomy). Cholecystectomy can be performed either by conventional open method or by laparoscopic technique [4]. Historically, open cholecystectomy (OC) was the standard surgical procedure for acute cholecystitis. However, the introduction of minimally invasive surgery and the advances in laparoscopic technology have made laparoscopic cholecystectomy (LC) the preferred method of treatment for gall bladder disease worldwide.

Laparoscopic cholecystectomy was introduced in the late 1980s and has rapidly gained popularity due to several advantages such as smaller incisions, reduced postoperative pain, shorter hospital stay, early ambulation, faster recovery, better cosmetic results and earlier return to normal activities [5]. By the early 1990s, almost 80 percent of the cholecystectomies performed in developed countries were laparoscopic. Thus, laparoscopic cholecystectomy has become the gold standard procedure for symptomatic gallstone disease [6].

Despite its advantages, the role of laparoscopic cholecystectomy in acute cholecystitis is still controversial. Acute cholecystitis is associated with acute inflammation, oedema, adhesions, and tissue friability, which make laparoscopic dissection technically difficult and may increase the risk of bile duct injury, hemorrhage, gallbladder perforation, and conversion to open surgery [7]. Such concerns have led many surgeons to prefer delayed surgery following conservative treatment and resolution of inflammation. However, early laparoscopic cholecystectomy during index admission has been strongly supported by recent studies and meta-analyses with reduced hospital stay and equivalent complication rates compared with delayed surgery [8]. Delayed surgery has also been shown to be associated with recurrent symptoms and readmissions to hospital in about 15–20% of elective surgery patients [9].

The Tokyo Guidelines were published in 2006, and revised in 2013, for standardization of the management of acute cholecystitis. The guidelines stratified acute cholecystitis into mild, moderate and severe according to the degree of inflammation of the gallbladder and systemic involvement [10]. The revised Tokyo Guidelines recommended laparoscopic cholecystectomy as the first choice in the treatment of mild and moderate acute cholecystitis, if sufficient surgical expertise and facilities exist. However, open cholecystectomy still plays an important role in severe inflammation, complicated cases, difficult anatomy, and when laparoscopic surgery is contraindicated or conversion is required.

Different studies comparing laparoscopic and open cholecystectomy in acute cholecystitis have reported reduced hospital stay, less postoperative pain, early recovery and wound-related complications with laparoscopic surgery [11]. But operative difficulty,

longer operative time, conversion rate and intraoperative complications remain in patients with severe acute inflammation. The comparison of the results of laparoscopic and open cholecystectomy is still of clinical interest to assess the safest and most effective method of surgical intervention in acute cholecystitis.

The present retrospective comparative study was undertaken to evaluate and compare laparoscopic and open cholecystectomy in patients with acute cholecystitis about operative time, postoperative complications, hospital stay, recovery, and overall surgical outcomes.

Methodology

Study Design: The present study will be a hospital-based retrospective comparative observational study conducted to compare laparoscopic cholecystectomy and open cholecystectomy in patients diagnosed with acute cholecystitis. The study will evaluate operative findings, postoperative complications, duration of hospital stay, conversion rate, and overall surgical outcomes associated with both surgical procedures.

Study Duration

The study will be conducted over a period of 10 months from May 2025 to February 2026

Study Area: The study will be carried out in the Department of General Surgery, Anugrah Narayan Magadh Medical College and Hospital, Gaya ji, Bihar, India.

Sample Size: A total of 120 patients diagnosed with acute cholecystitis and treated surgically either by laparoscopic cholecystectomy or open cholecystectomy will be included in the study.

Inclusion Criteria

- Patients are diagnosed with acute cholecystitis based on clinical examination, laboratory investigations, and ultrasonography findings.
- Patients aged 18 years and above.
- Patients of both genders.
- Patients who underwent laparoscopic cholecystectomy or open cholecystectomy.
- Patients with complete medical and operative records available in the hospital database.

Exclusion Criteria

- Patients with gallbladder malignancy.
- Patients with perforated gallbladder and generalized peritonitis.
- Patients managed conservatively without surgery.
- Patients with severe uncontrolled systemic illness making them unfit for surgery.
- Pregnant women.

- Patients with incomplete hospital records or inadequate follow-up data.

Data Collection: Data for the present study will be collected retrospectively from hospital records, operative notes, inpatient case sheets, discharge summaries, investigation reports, and follow-up records of patients diagnosed with acute cholecystitis. A structured case record proforma will be prepared to collect detailed information regarding demographic profile, presenting symptoms, laboratory findings, ultrasonography findings, timing of surgery, type of surgical procedure performed, operative duration, intraoperative findings, conversion from laparoscopic to open surgery, postoperative complications, duration of hospital stay, and recovery outcomes. All collected information will be entered systematically into a master chart while maintaining confidentiality of patient details.

Procedure: All patients included in the study will be evaluated through retrospective analysis of their medical records. Diagnosis of acute cholecystitis will be confirmed based on clinical features, laboratory investigations, and ultrasonography findings. Patients undergoing laparoscopic cholecystectomy will be compared with those undergoing open cholecystectomy regarding operative time, intraoperative difficulties, postoperative pain, wound infection, bile leakage, duration of drain placement, conversion rate, postoperative complications, and

length of hospital stay. Details regarding timing of surgery, severity of inflammation, adhesions, gallbladder perforation, and intraoperative bleeding will also be recorded. Outcomes of both procedures will be analyzed to determine the safer and more effective surgical approach for management of acute cholecystitis.

Statistical Analysis: The collected data will be entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) software version 25.0. Descriptive statistics such as mean, standard deviation, frequency, and percentage will be used to summarize demographic and clinical variables. Comparative analysis between laparoscopic cholecystectomy and open cholecystectomy groups will be performed using Chi-square test for categorical variables and Student's t-test for continuous variables. A p-value of less than 0.05 will be considered statistically significant. Results will be presented in the form of tables, charts, and graphs for better interpretation and comparison of surgical outcomes".

Result

Table 1 displays the age distribution of patients with acute cholecystitis who were enrolled in the study. The most common age group among the patients was 31–40 years (30%) followed by 41–50 years (26.7%). This shows that acute cholecystitis is more prevalent in middle aged people.

Table 1: Age Distribution of Patients with Acute Cholecystitis (n = 120)		
Age Group (Years)	Number of Patients	Percentage (%)
18–30 years	18	15.00%
31–40 years	36	30.00%
41–50 years	32	26.70%
51–60 years	22	18.30%
>60 years	12	10.00%
Total	120	100%

Table 2 illustrates the gender distribution of the patients who were studied. Females represented 65% of cases and males 35%. The higher frequency

among females may be related to the increased incidence of gallstone disease among women.

Table 2: Gender Distribution of Patients with Acute Cholecystitis		
Gender	Number of Patients	Percentage (%)
Male	42	35.00%
Female	78	65.00%
Total	120	100%

Table 3 displays the distribution of surgical procedures performed for acute cholecystitis. Most of the patients underwent laparoscopic cholecystectomy (68.3%) while open cholecystectomy was per-

formed in 31.7% cases. This finding is consistent with the increasing preference for laparoscopic surgery for the management of acute cholecystitis.

Table 3: Distribution According to Type of Surgical Procedure		
Surgical Procedure	Number of Patients	Percentage (%)
Laparoscopic Cholecystectomy	82	68.30%
Open Cholecystectomy	38	31.70%

Total	120	100%
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In Table 4, the mean operative time for laparoscopic and open cholecystectomy is compared. The mean operative time was shorter in Laparoscopic Cholecystectomy (82.4 ± 14.6 min.) than in Open Chole-

cystectomy (96.8 ± 18.2 min.) The difference was statistically significant ($p < 0.05$) and implied better operative efficiency with laparoscopic surgery.

Table 4: Comparison of Mean Operative Time Between Laparoscopic and Open Cholecystectomy			
Surgical Procedure	Mean Operative Time (Minutes)	Standard Deviation	P-value
Laparoscopic Cholecystectomy	82.4	14.6	
Open Cholecystectomy	96.8	18.2	0.021*

In Table 5, the postoperative complications that were observed following laparoscopic and open cholecystectomy are illustrated. Wound infection, postoperative fever, respiratory complications and

bile leak were observed more in patients who underwent open cholecystectomy than laparoscopic cholecystectomy. Thus, laparoscopic cholecystectomy was associated with less postoperative morbidity.

Table 5: Postoperative Complications Following Cholecystectomy		
Postoperative Complications	Laparoscopic Cholecystectomy (n=82)	Open Cholecystectomy (n=38)
Wound Infection	6 (7.3%)	10 (26.3%)
Bile Leak	2 (2.4%)	3 (7.9%)
Postoperative Fever	8 (9.7%)	9 (23.7%)
Respiratory Complications	3 (3.6%)	7 (18.4%)

Discussion

Acute cholecystitis is one of the commonest complications of gallstone disease. It is still an important cause of surgical admissions worldwide. In the last few decades, there has been a dramatic change in the management of acute cholecystitis, especially with the advent and acceptance of laparoscopic cholecystectomy. Cholecystectomy was previously performed in an open manner, but laparoscopic cholecystectomy has slowly become the treatment of choice because it is less invasive and has better postoperative results. This prospective comparative study was conducted to compare the operative outcome, postoperative complications, conversion rate and length of hospital stay in laparoscopic cholecystectomy and open cholecystectomy in patients of acute cholecystitis".

Several prospective studies and meta-analyses support early surgical intervention for the treatment of acute cholecystitis. In the pre-laparoscopic era, early open cholecystectomy was better than delayed surgery with shorter hospital stay and earlier recovery [12]. Several studies subsequently confirmed that early laparoscopic cholecystectomy during the same hospital admission is safe, feasible and associated with better patient outcomes [13] with the advent of minimally invasive surgery. In the present study, most patients were operated on during the same admission which decreased the repeated hospital visits and recurrent biliary symptoms.

Laparoscopic cholecystectomy is the gold standard procedure for symptomatic gallstone disease because of its advantages including less postoperative pain, smaller incisions, faster recovery, shorter hos-

pitalization and early return to normal activities. In most patients underwent laparoscopic cholecystectomy as compared to open cholecystectomy as there is a shift towards laparoscopic surgery in current surgical practice. Similar trends were seen in previous studies, where laparoscopic procedures were progressively replacing open surgeries with the increase in surgical expertise and technological advancement [14].

Laparoscopic cholecystectomy in acute cholecystitis is technically challenging despite its benefits, due to the clinical situation where acute inflammation, oedema, adhesions and tissue friability can obscure anatomy and make the operation difficult [15]. Surgeons have often deferred laparoscopic intervention in acute cholecystitis because of concerns about increased morbidity, bile duct injury, severe hemorrhage and conversion to open surgery. However, the findings of the present study indicate that the postoperative morbidity of laparoscopic cholecystectomy was lower than that of open cholecystectomy. Open surgery patients had a higher incidence of postoperative wound infection, respiratory complications and postoperative fever. Similar results were found in previous meta-analysis where laparoscopic surgery significantly reduced wound infection and pulmonary complications [16].

The present study demonstrated that the hospital stay was significantly shorter in patients who underwent laparoscopic cholecystectomy compared to open cholecystectomy. These results are consistent with previous studies showing better postoperative recovery and earlier mobilization after laparoscopic procedures [17]. The reduction of hospitalization leads to greater patient satisfaction, less strain on

healthcare systems and lower overall treatment costs. Previous cost effectiveness studies have also shown that laparoscopic cholecystectomy is associated with better quality of life and lower health care costs compared to delayed or open procedures

The present study did not show significant differences in operative time between laparoscopic and open cholecystectomy, however, laparoscopic procedures required meticulous dissection in inflamed operative fields. Similar observations were reported in previous studies where operative times between both techniques were found to be comparable [18]. Laparoscopic surgery in acute cholecystitis has become safer and more efficient due to the development of laparoscopic instruments, surgeons' experience, and adherence to standardized techniques such as the critical view of safety [19].

Conversion from laparoscopic to open surgery remains a significant problem in acute cholecystitis. In the present study, a small proportion of patients was converted due to dense adhesions, severe inflammation, vague anatomy and intra-operative bleeding. Conversion rates of 5% to 30% have been reported in previous studies. Longer duration of symptoms, severe inflammation, high white blood cell count, older age, and surgeon inexperience are associated with higher conversion rates [20]. However, surgical experience and better patient selection have helped to slowly lower conversion rates over the years.

Overall postoperative mortality after cholecystectomy is low but higher in the elderly and in patients with major cardiopulmonary comorbidities. In the present study, significant mortality was not found, and overall outcome was favorable in laparoscopic group. Similar results have been shown in other studies of reduced postoperative morbidity and mortality after laparoscopic procedures compared with open surgery [21].

Laparoscopic cholecystectomy was recommended as the first-line treatment for mild and moderate acute cholecystitis whenever adequate surgical expertise and facilities were available, as recommended by Tokyo Guidelines 2013 and revised Tokyo Guidelines 2018 [22]. The present study findings are in accordance with these recommendations as laparoscopic cholecystectomy has a safe and effective outcome with lesser complications, shorter hospital stay and faster postoperative recovery compared to open cholecystectomy.

In conclusion, the present study validates the significant benefits of laparoscopic cholecystectomy compared to open cholecystectomy in the treatment of acute cholecystitis. Early surgery intervention improved laparoscopic expertise, careful patient selection and adherence to safe surgical principles can further improve patient outcomes and minimize postoperative complications.

Conclusion

The present retrospective comparative study was conducted in the Department of General Surgery, Anugrah Narayan Magadh Medical College and Hospital and it showed that laparoscopic cholecystectomy is a safe, effective and preferable surgical procedure in the management of acute cholecystitis in comparison to open cholecystectomy. Many patients were middle aged females reflecting the higher prevalence of gallstone disease in females. In comparison with open cholecystectomy, laparoscopic cholecystectomy was associated with shorter operative time, fewer postoperative complications, shorter length of hospital stay, faster postoperative recovery and lower wound related morbidity. In some difficult cases with severe inflammation and adhesions conversion to open surgery was needed. But in general, the success rate of laparoscopic management was high. Open cholecystectomy was associated with increased post-operative pain, wound infection, respiratory complications and prolonged hospitalization. Therefore, early laparoscopic cholecystectomy in the same admission seems to provide better clinical results and better patient recovery in acute cholecystitis. Proper patient selection, surgical expertise and early intervention remain the cornerstones to reduce complications and achieve good surgical results.

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