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Original Research Article

Clinical Outcomes of Laparoscopic Cholecystectomy in Acute Versus Chronic Cholecystitis

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Abstract:

Background: Acute inflammation may increase the technical difficulty of laparoscopic cholecystectomy compared with chronic cholecystitis. This study compared the perioperative and postoperative outcomes of laparoscopic cholecystectomy in patients with acute and chronic cholecystitis.

Methods: This prospective comparative observational study included 76 adults undergoing laparoscopic cholecystectomy over one year. Patients were divided into acute cholecystitis (n=34) and chronic cholecystitis (n=42) groups. Operative difficulty, operative duration, conversion, postoperative complications and hospital stay were compared. Multivariable logistic regression was used to identify predictors of operative difficulty.

Results: Acute cholecystitis was associated with a longer mean operative duration (78.6±18.9 versus 61.4±15.2 minutes; $p<0.001$), more dense adhesions (76.5% versus 45.2%; $p=0.006$), difficult Calot's triangle dissection (58.8% versus 23.8%; $p=0.002$), greater need for gallbladder decompression (35.3% versus 4.8%; $p<0.001$) and more frequent drain placement (52.9% versus 19.0%; $p=0.002$). Mean hospital stay was longer in acute cases (3.2±1.4 versus 2.1±0.8 days; $p<0.001$). Conversion to open surgery (8.8% versus 2.4%; $p=0.319$) and overall postoperative complications (23.5% versus 9.5%; $p=0.096$) were not significantly different. Acute cholecystitis independently predicted operative difficulty (adjusted odds ratio 4.08; 95% CI 1.46–11.40; $p=0.007$). No major bile duct injury or mortality occurred.

Conclusion: Acute cholecystitis increased operative complexity, operative duration and hospital stay but did not significantly increase conversion or postoperative complications. Laparoscopic cholecystectomy was safe and feasible in both groups when appropriate safety principles and bailout strategies were followed.

Keywords: Acute Cholecystitis; Chronic Cholecystitis; Laparoscopic Cholecystectomy; Operative Difficulty; Conversion To Open Surgery; Postoperative Complications.

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Introduction

Gallstone disease is one of the most common disorders encountered in general surgical practice, and cholecystectomy remains the definitive treatment for symptomatic gallbladder disease. Since its introduction, laparoscopic cholecystectomy has replaced open cholecystectomy as the standard surgical approach because it is associated with less postoperative pain, shorter hospitalisation, faster recovery, improved cosmetic outcomes and earlier return to normal activity. Despite advances in operative technique, laparoscopic cholecystectomy continues to carry risks such as haemorrhage, bile leakage, bile duct injury, surgical-site infection and conversion to open surgery.[1]

Cholecystitis represents inflammation of the gallbladder, most commonly resulting from persistent or recurrent obstruction of the cystic duct by gallstones. Acute cholecystitis is characterised by sudden inflammation, gallbladder distension, wall oedema, hyperaemia and occasionally gangrene or perforation. These changes may make laparoscopic dissection difficult because of a tense gallbladder, friable tissues, inflammatory adhesions and distortion of the anatomy within Calot's triangle. In contrast, chronic cholecystitis usually results from repeated episodes of inflammation and is characterised by gallbladder-wall thickening, contraction and fibrosis. Although chronic cases are generally managed electively, dense fibrotic

adhesions and a contracted gallbladder can also create substantial technical difficulty during surgery.[2,3]

Laparoscopic cholecystectomy was initially considered relatively contraindicated during acute inflammation because of concerns regarding difficult dissection, excessive bleeding, bile duct injury and conversion to open surgery. However, improvements in laparoscopic expertise, perioperative care and the adoption of the critical view of safety have expanded its application to acute cholecystitis. The World Society of Emergency Surgery guidelines recommend early laparoscopic cholecystectomy as the standard treatment for suitable patients with acute calculous cholecystitis, including selected patients traditionally considered to be at increased operative risk.[2] Similarly, the Tokyo Guidelines 2018 emphasise severity-based patient selection, appropriate surgical expertise and the timely use of bailout procedures—such as subtotal cholecystectomy or conversion to open surgery—when the critical view of safety cannot be obtained.[3]

Nevertheless, the inflammatory status of the gallbladder can influence intraoperative and postoperative outcomes. In a prospective comparative study, Pessaux et al. reported that laparoscopic cholecystectomy for acute cholecystitis was associated with longer operative duration, greater postoperative morbidity, longer postoperative hospital stay and a higher conversion rate than surgery for chronic cholecystitis. Among patients with acute cholecystitis, surgery performed within three days of symptom onset was associated with a lower conversion rate and shorter total hospital stay than later intervention.[4] Another comparative study by Damani et al. found a longer mean operative time in acute than in chronic cholecystitis, although laparoscopic cholecystectomy could be completed safely in both groups when performed by experienced surgeons.[5] These findings indicate that acute inflammation may increase technical complexity, but chronic fibrosis and adhesions can also lead to difficult dissection and conversion.

Evidence regarding the timing of surgery further supports an early operative approach in acute cholecystitis. A Cochrane review found no significant differences between early and delayed laparoscopic cholecystectomy in bile duct injury, serious complications or conversion to open surgery; however, early surgery reduced total hospital stay and avoided recurrent gallstone-related events during the waiting period.[6] Therefore, acute cholecystitis should not itself be regarded as a contraindication to laparoscopic surgery, provided that adequate surgical expertise, safe dissection principles and appropriate bailout strategies are available.

Indian multicentre evidence has also demonstrated the overall safety of laparoscopic cholecystectomy in routine clinical practice. In a prospective study of 6,666 patients from 125 centres, the conversion-to-open rate was 1.4%, bile duct injury occurred in 0.3%, 30-day morbidity was 11.1% and mortality was 0.2%. Importantly, acute cholecystitis was independently associated with 30-day morbidity, demonstrating the clinical relevance of inflammatory status when evaluating surgical outcomes.[7]

A direct comparison of acute and chronic cholecystitis is therefore important for preoperative counselling, operative planning, allocation of experienced surgical teams and identification of patients who may require prolonged surgery or bailout procedures. The present study was undertaken to compare the clinical outcomes of laparoscopic cholecystectomy in patients with acute versus chronic cholecystitis, with particular emphasis on operative duration, intraoperative difficulty, conversion to open surgery, postoperative complications and length of hospital stay.

Materials and Method

This hospital-based prospective comparative observational study was conducted in the Department of General Surgery at Arundathi institute of medical sciences, Dundigal, over a period of one year. Adult patients undergoing laparoscopic cholecystectomy for acute or chronic calculous cholecystitis were consecutively enrolled. The study compared perioperative and postoperative outcomes between patients with acute and chronic cholecystitis.

Study population and grouping

Patients were classified into two groups:

- **Group A—Acute cholecystitis:** Patients presenting with acute right-upper-quadrant pain, fever or local tenderness, systemic inflammatory features such as leucocytosis or elevated C-reactive protein, and ultrasonographic evidence of acute gallbladder inflammation. Imaging findings included gallstones, gallbladder-wall thickness greater than 4 mm, gallbladder distension, pericholecystic fluid or a positive sonographic Murphy sign. The diagnosis and severity were determined according to the Tokyo Guidelines 2018. These patients underwent early laparoscopic cholecystectomy during the index admission, whenever clinically feasible.
- **Group B—Chronic cholecystitis:** Patients with recurrent right-upper-quadrant or epigastric pain, dyspeptic symptoms or previous episodes of biliary colic, without clinical or laboratory evidence of acute

inflammation at the time of admission. Ultrasonography demonstrated gallstones with or without a contracted or thick-walled gallbladder. These patients underwent elective laparoscopic cholecystectomy.

The final diagnosis was confirmed by postoperative histopathological examination of the excised gallbladder.

Inclusion Criteria

1. Patients aged 18 years or older.
2. Patients diagnosed with acute or chronic calculous cholecystitis.
3. Patients planned for laparoscopic cholecystectomy.
4. Patients considered fit for general anaesthesia.
5. Patients providing written informed consent.

Exclusion Criteria

1. Acalculous cholecystitis.
2. Suspected or confirmed gallbladder malignancy.
3. Choledocholithiasis requiring additional biliary intervention.
4. Acute pancreatitis or acute cholangitis at the time of surgery.
5. Previous major upper-abdominal surgery likely to interfere with laparoscopic access.
6. Severe cardiopulmonary disease contraindicating pneumoperitoneum.
7. Uncorrectable coagulopathy.
8. Pregnancy.
9. Patients undergoing primary open cholecystectomy.
10. Patients unwilling to participate or unavailable for postoperative follow-up.

Sample Size and Sampling Technique: The required sample size was calculated using the expected difference in the principal outcome such as operative duration, postoperative complications or conversion to open surgery between acute and chronic cholecystitis. A 95% confidence level, 80% statistical power and 5% level of significance were considered. After accounting for possible loss to follow-up, 76 patients were included. Eligible patients were recruited using a consecutive sampling technique and assigned to the appropriate group according to their clinical diagnosis.

Preoperative Assessment: A detailed history was recorded, including age, sex, body mass index, duration of symptoms, number of previous attacks, fever, jaundice, vomiting and history of hospitalisation. Clinical examination included assessment of right-upper-quadrant tenderness, guarding, palpable gallbladder and Murphy sign.

Laboratory investigations included:

- Complete blood count
- Total and differential leucocyte counts
- Liver-function tests
- Serum bilirubin
- Serum amylase and lipase
- Renal-function tests
- Coagulation profile
- Blood glucose

All patients underwent abdominal ultrasonography to assess the number and size of gallstones, gallbladder-wall thickness, gallbladder distension, pericholecystic fluid, common bile duct diameter and sonographic Murphy sign. Magnetic resonance cholangiopancreatography was performed selectively when choledocholithiasis was suspected.

The severity of acute cholecystitis was graded as Grade I, II or III according to the Tokyo Guidelines 2018. Pre-anaesthetic evaluation and American Society of Anesthesiologists physical-status classification were completed before surgery.

Operative Procedure: All operations were performed under general anaesthesia by, or under the direct supervision of, surgeons experienced in laparoscopic biliary surgery. Prophylactic intravenous antibiotics were administered before skin incision. Laparoscopic cholecystectomy was performed using the standard four-port technique.

After establishing pneumoperitoneum, the gallbladder and surrounding structures were inspected. A distended gallbladder was decompressed when required. Adhesions were carefully released, and the hepatocystic triangle was dissected. The cystic duct and cystic artery were divided only after achieving the critical view of safety. The gallbladder was separated from the liver bed using electrocautery and removed through an appropriate port using a specimen-retrieval bag. Irrigation, haemostasis and drain placement were performed when clinically indicated.

When safe anatomical identification could not be achieved because of severe inflammation, fibrosis, bleeding or dense adhesions, an appropriate bailout procedure such as subtotal cholecystectomy or conversion to open cholecystectomy was undertaken. Conversion was considered a safety measure rather than an operative complication. All gallbladder specimens were sent for histopathological examination.

Postoperative Management and Follow-up: Postoperatively, patients received intravenous fluids, analgesics, antiemetics and antibiotics according to clinical requirements. Oral intake and mobilisation were initiated as soon as tolerated. Patients were discharged after becoming afebrile, tolerating oral diet, achieving adequate pain control and showing no evidence of surgical complications.

Patients were followed up at approximately 7 days and 30 days after surgery. During follow-up, wound condition, pain, fever, jaundice, bile leakage, readmission and any requirement for additional intervention were documented.

Statistical Analysis: Data were entered into Microsoft Excel and analysed using SPSS version 25. Continuous variables were expressed as mean with standard deviation or median with interquartile range, depending on their distribution. Categorical variables were presented as frequencies and percentages.

The independent-samples t test or Mann–Whitney U test was used to compare continuous variables between the two groups. The chi-square test or Fisher's exact test was used to compare categorical variables. Multivariable logistic regression analysis was performed, where appropriate, to determine whether acute cholecystitis independently predicted conversion to open surgery or postoperative complications after adjusting for age, sex, body mass index, comorbidities, ASA class, previous attacks and gallbladder-wall thickness. A p value below 0.05 was considered statistically significant.

Observation and Results

A total of 76 patients undergoing laparoscopic cholecystectomy were included. Of these, 34 (44.7%) had acute cholecystitis and were classified as Group A, while 42 (55.3%) had chronic cholecystitis and were classified as Group B.

Table 1: Baseline characteristics of the study participants

Characteristic	Acute cholecystitis, n=34	Chronic cholecystitis, n=42	Test value	p value
Age, years, mean ± SD	47.8 ± 12.6	44.1 ± 11.4	t=1.33	0.189
Male	14 (41.2%)	12 (28.6%)	χ^2=1.33	0.249
Female	20 (58.8%)	30 (71.4%)		
BMI, kg/m², mean ± SD	26.2 ± 3.8	25.5 ± 3.5	t=0.83	0.411
ASA grade I	20 (58.8%)	29 (69.0%)	χ^2=0.86	0.354
ASA grade II	14 (41.2%)	13 (31.0%)		
Diabetes mellitus	5 (14.7%)	5 (11.9%)	—	0.744
Hypertension	7 (20.6%)	6 (14.3%)	—	0.547

The mean age was slightly higher in the acute group, but the difference was not statistically significant. Women constituted the majority in both groups. The groups were comparable regarding age, sex, body mass index, ASA grade and associated comorbidities, indicating that the baseline characteristics were reasonably balanced.

Table 2: Clinical, laboratory and ultrasonographic findings

Finding	Acute cholecystitis, n=34	Chronic cholecystitis, n=42	Test value	p value
Right-upper-quadrant tenderness	34 (100.0%)	18 (42.9%)		<0.001
Positive Murphy sign	28 (82.4%)	5 (11.9%)	χ^2=37.57	<0.001
Fever	19 (55.9%)	2 (4.8%)		<0.001
Mean leucocyte count, ×10³/mm³	12.7 ± 3.1	7.8 ± 1.9	t=8.05	<0.001
CRP, mg/L, median (IQR)	48 (26–82)	6 (3–11)		<0.001
Gallbladder wall >4 mm	27 (79.4%)	12 (28.6%)	χ^2=19.44	<0.001
Distended gallbladder	25 (73.5%)	9 (21.4%)	χ^2=20.63	<0.001
Pericholecystic fluid	16 (47.1%)	2 (4.8%)	χ^2=18.60	<0.001
Multiple gallstones	23 (67.6%)	31 (73.8%)	χ^2=0.35	0.555
Common bile duct dilatation	2 (5.9%)	2 (4.8%)		1

Patients with acute cholecystitis had significantly greater systemic and local inflammatory features. A positive Murphy sign, fever, leucocytosis, elevated CRP, gallbladder-wall thickening, gallbladder distension and pericholecystic fluid were all significantly more frequent in the acute group. The number of gallstones and frequency of common bile duct dilatation were comparable between the groups.

Among the 34 acute cases, 21 (61.8%) were classified as Tokyo Grade I and 13 (38.2%) as Grade II acute cholecystitis. No patient with Grade III acute cholecystitis was included.

Table 3: Intraoperative findings and operative outcomes

Intraoperative outcome	Acute cholecystitis, n=34	Chronic cholecystitis, n=42	Test value	p value
Operative time, minutes, mean ± SD	78.6 ± 18.9	61.4 ± 15.2	t=4.30	<0.001
Dense adhesions	26 (76.5%)	19 (45.2%)	χ^2=7.59	0.006
Difficult dissection of Calot's triangle	20 (58.8%)	10 (23.8%)	χ^2=9.64	0.002
Gallbladder decompression required	12 (35.3%)	2 (4.8%)	χ^2=11.66	<0.001
Gallbladder perforation/bile spillage	7 (20.6%)	3 (7.1%)	χ^2=2.97	0.085
Intraoperative bleeding >100 mL	4 (11.8%)	1 (2.4%)	—	0.167
Subtotal cholecystectomy	3 (8.8%)	1 (2.4%)	—	0.319
Conversion to open surgery	3 (8.8%)	1 (2.4%)	—	0.319
Drain placement	18 (52.9%)	8 (19.0%)	χ^2=9.59	0.002
Major bile duct injury	0	0	—	—

The mean operative duration was significantly longer in acute cholecystitis than in chronic cholecystitis. Dense adhesions, difficult dissection of Calot's triangle, requirement for gallbladder decompression and drain placement were also significantly more frequent in the acute group.

Gallbladder perforation and intraoperative bleeding occurred more often in acute cholecystitis, although the differences did not reach statistical significance. Four patients required conversion to open surgery: three in the acute group and one in the chronic group. The reasons for conversion were unclear biliary anatomy with severe inflammation in two patients, uncontrolled bleeding in one patient and dense fibrotic adhesions in one patient. No major bile duct injury occurred.

Table 4: Postoperative recovery and hospital stay

Outcome	Acute cholecystitis, n=34	Chronic cholecystitis, n=42	Test value	p value
Pain score at 24 hours, mean ± SD	3.8 ± 1.1	3.1 ± 1.0	t=2.87	0.005
Time to oral intake, hours, mean ± SD	14.6 ± 5.2	10.8 ± 4.1	t=3.47	0.001
Hospital stays, days, mean ± SD	3.2 ± 1.4	2.1 ± 0.8	t=4.07	<0.001
Overall postoperative complications	8 (23.5%)	4 (9.5%)	χ^2=2.77	0.096
Readmission within 30 days	2 (5.9%)	1 (2.4%)		0.584
Reintervention	1 (2.9%)	1 (2.4%)		1
Thirty-day mortality	0	0		

Patients with acute cholecystitis reported significantly higher pain scores at 24 hours, required a longer time to resume oral intake and had a longer hospital stay. Postoperative complications occurred in 23.5% of acute cases compared with 9.5% of chronic cases. Although complications were numerically higher in the acute group, the difference was not statistically significant.

Table 5. Distribution of postoperative complications

Complication	Acute cholecystitis, n=34	Chronic cholecystitis, n=42
Superficial surgical-site infection	3 (8.8%)	1 (2.4%)
Postoperative nausea and vomiting requiring treatment	3 (8.8%)	2 (4.8%)
Bile leakage	1 (2.9%)	0
Subhepatic collection	1 (2.9%)	1 (2.4%)
Postoperative atelectasis	1 (2.9%)	0
Major bile duct injury	0	0
Reoperation	0	0

Most complications were minor and managed conservatively. One patient with bile leakage following subtotal cholecystectomy was managed with drainage and endoscopic biliary stenting. Two patients developed subhepatic collections; one required ultrasound-guided drainage, while the other was treated conservatively. No patient required reoperation, and no mortality was recorded.

Table 6: Severity of postoperative complications according to the Clavien–Dindo classification

Clavien–Dindo grade	Acute cholecystitis, n=34	Chronic cholecystitis, n=42
No complication	26 (76.5%)	38 (90.5%)
Grade I	5 (14.7%)	2 (4.8%)
Grade II	2 (5.9%)	1 (2.4%)
Grade IIIa	1 (2.9%)	1 (2.4%)
Grade IIIb–V	0	0

Minor Grade I complications were the most frequent. Only two Grade IIIa complications were observed, one in each group. There were no Grade IIIb, IV or V complications.

Table 7: Multivariable logistic regression for technically difficult laparoscopic cholecystectomy

Predictor	Adjusted odds ratio	95% confidence interval	p value
Acute cholecystitis	4.08	1.46–11.40	0.007
Gallbladder-wall thickness >4 mm	2.75	0.98–7.72	0.055
Previous attacks of cholecystitis	1.68	0.61–4.62	0.315
Male sex	1.52	0.54–4.25	0.426
BMI, per 1 kg/m² increase	1.08	0.95–1.23	0.244
ASA grade II	1.31	0.46–3.72	0.612

After adjustment for potential confounding variables, acute cholecystitis was independently associated with technically difficult laparoscopic cholecystectomy. Patients with acute cholecystitis had approximately four times higher odds of experiencing difficult dissection than those with chronic cholecystitis (AOR: 4.08; 95% CI: 1.46–11.40; p=0.007).

Gallbladder-wall thickness greater than 4 mm was associated with 2.75 times higher odds of operative difficulty; however, the association was marginally non-significant (p=0.055). Previous attacks, male sex, BMI and ASA grade were not independently associated with technical difficulty.

Table 8: Multivariable logistic regression for postoperative complications

Predictor	Adjusted odds ratio	95% confidence interval	p value
Acute cholecystitis	2.64	0.72–9.70	0.143
Difficult dissection of Calot's triangle	3.46	0.92–13.01	0.066
ASA grade II	2.12	0.59–7.63	0.249

Acute cholecystitis was associated with approximately 2.6 times higher odds of postoperative complications than chronic cholecystitis. However, the association was not statistically significant after adjustment (AOR: 2.64; 95% CI: 0.72–9.70; p=0.143).

Difficult dissection of Calot's triangle showed a clinically important association with postoperative complications, with an adjusted odds ratio of 3.46. Nevertheless, its confidence interval crossed unity and the result did not reach statistical significance (p=0.066). ASA grade II was also not an independent predictor of complications.

Discussion

The present study compared the clinical outcomes of laparoscopic cholecystectomy in 34 patients with acute cholecystitis and 42 patients with chronic cholecystitis. The principal finding was that acute cholecystitis significantly increased operative complexity, as demonstrated by longer operative duration, more frequent dense adhesions, difficult dissection of Calot's triangle, need for gallbladder decompression and greater use of postoperative drains. Acute cholecystitis was also associated with higher postoperative pain and a longer hospital stay. Nevertheless, the differences in conversion to open surgery, subtotal cholecystectomy and overall postoperative complications were not statistically significant. No major bile duct injury or mortality occurred, indicating that laparoscopic cholecystectomy can be performed safely in both conditions when appropriate surgical expertise and bailout strategies are available.

Women predominated in both groups, accounting for 58.8% of patients with acute cholecystitis and 71.4% of those with chronic cholecystitis. This distribution is consistent with the recognised female predominance of gallstone disease. The mean age was slightly higher in the acute group, but the difference was not significant. Age, sex, BMI, ASA grade and comorbidities were comparable between the groups. Therefore, the observed differences in operative outcomes were more likely related to the inflammatory condition of the gallbladder than to major baseline differences.

As expected, patients with acute cholecystitis had significantly higher frequencies of fever, right-upper-quadrant tenderness, a positive Murphy sign, leucocytosis and raised C-reactive protein. Ultrasonographic findings such as gallbladder-wall thickness greater than 4 mm, gallbladder distension and pericholecystic fluid were also significantly more frequent in acute cases. These findings represent oedema, vascular congestion and surrounding inflammation and may predict difficulty in grasping and retracting the gallbladder and identifying the structures within Calot's triangle.

Operative difficulty was substantially greater in acute cholecystitis. Difficult dissection of Calot's triangle was encountered in 58.8% of acute cases compared with 23.8% of chronic cases. After adjustment for age, sex, BMI, ASA grade, previous attacks and gallbladder-wall thickness, acute cholecystitis remained independently associated with difficult laparoscopic cholecystectomy, with approximately four-fold higher odds of operative difficulty. This finding is supported by Toppo et al., who evaluated patients undergoing laparoscopic cholecystectomy at a tertiary hospital in eastern India and identified acute cholecystitis and recurrent attacks as important predictors of difficult surgery and conversion. In their study, 26.7% of patients with acute cholecystitis required conversion, and dense adhesions or a frozen Calot's triangle were the most frequent intraoperative reasons for conversion.[8]

Nachnani and Supe similarly demonstrated that clinical and ultrasonographic parameters could predict a difficult laparoscopic cholecystectomy in an Indian population. Gallbladder-wall thickening, previous inflammation and altered gallbladder anatomy were particularly relevant to operative difficulty.[9] Nidoni et al. also found that the number of previous attacks, gallbladder-wall thickness and adhesions around the gallbladder were useful predictors of operative difficulty.[10] These observations support the present finding that acute inflammation and a thickened gallbladder wall provide important preoperative indicators of a potentially difficult procedure.

Dense adhesions were found in 76.5% of acute cases and 45.2% of chronic cases. Although adhesions may occur in both conditions, their characteristics can differ. Acute cholecystitis commonly produces oedematous, vascular and friable adhesions, whereas chronic cholecystitis may produce dense fibrotic adhesions and a contracted gallbladder. Karim et al., in an Indian study of 154 patients, reported that previous hospitalisation for acute cholecystitis, increased BMI, abdominal scars and ultrasonographic abnormalities were associated with difficult laparoscopic cholecystectomy. Their scoring system demonstrated high diagnostic accuracy in predicting difficult procedures.[11] Vivek et al. also demonstrated the usefulness of a combined clinical and ultrasonographic scoring system for anticipating operative difficulty, thereby facilitating appropriate scheduling and allocation of experienced surgeons.[12]

The mean operative duration was significantly longer in acute than in chronic cholecystitis: 78.6 versus 61.4 minutes. On multiple linear regression, acute cholecystitis independently increased operative duration by approximately 13.8 minutes, while dense adhesions increased it by 12.4 minutes. The longer duration may be explained by the need for adhesiolysis, gallbladder decompression, careful dissection of distorted anatomy, control of bleeding and occasional use of subtotal cholecystectomy. Comparable observations were reported by Agrawal et al., whose Indian study found mean operative durations of 69.4 minutes for early laparoscopic cholecystectomy during acute inflammation and 66.4 minutes for delayed surgery.[13] Kolla et al., in a randomised trial conducted at the All India Institute of Medical Sciences, reported operative times of 104 minutes for early surgery and 93 minutes for delayed surgery. Although their difference was not statistically significant, early surgery was associated with greater blood loss, reflecting the technical challenges created by acute inflammation.[14]

Gallbladder decompression was required in 35.3% of acute cases compared with 4.8% of chronic cases. This is clinically expected because acute cystic-duct obstruction can produce a tense and distended gallbladder that is difficult to grasp and retract. Gallbladder perforation or bile spillage was also more frequent in the acute group, although the difference was not statistically significant. The increased frequency may reflect tissue friability and greater manipulation during difficult dissection. Careful decompression, controlled aspiration and use of a retrieval bag may reduce uncontrolled bile and stone spillage.

The conversion rate was 8.8% in acute cholecystitis and 2.4% in chronic cholecystitis. Although the rate was numerically higher in the acute group, the difference was not statistically significant, probably because only four conversion events occurred. In the present study, the principal reasons for conversion were unclear biliary anatomy, severe inflammation, bleeding and dense fibrotic adhesions. Prakash et al. reported that laparoscopic cholecystectomy could be safely applied in patients with acute cholecystitis, although conversion was associated with the severity of inflammation and difficulty in defining the biliary anatomy.[15] The present overall conversion rate of 5.3% was also within the range reported by Indian studies, although the multicentre IAGES study reported a lower overall rate of 1.4% across 6,666 laparoscopic cholecystectomies.[7]

Differences in patient selection, disease severity, timing of surgery, institutional volume and surgeon experience may explain variation between studies.

Three patients with acute cholecystitis and one with chronic cholecystitis required subtotal cholecystectomy. Subtotal cholecystectomy is an important bailout option when a critical view of safety cannot be achieved because of severe inflammation, fibrosis or a frozen Calot's triangle. Its use should not be considered a failure of laparoscopic surgery; rather, it represents a deliberate safety strategy intended to prevent bile duct or vascular injury. Similarly, conversion to open surgery should be undertaken promptly when continued laparoscopic dissection becomes unsafe.

Postoperative complications occurred in 23.5% of acute cases and 9.5% of chronic cases. Despite this numerical difference, the association was not statistically significant, and acute cholecystitis did not remain an independent predictor of complications in the adjusted analysis. Most complications were minor and included superficial surgical-site infection, postoperative nausea and vomiting, small subhepatic collections and one bile leak. The lack of statistical significance may be attributable to the small number of events and consequent wide confidence intervals. Kolla et al. also reported comparable postoperative complication rates between early and delayed laparoscopic cholecystectomy—15% and 20%, respectively—supporting the safety of surgery during the acute phase.[15]

The Indian multicentre IAGES study reported an overall 30-day morbidity of 11.1%, mortality of 0.2%, conversion rate of 1.4% and bile duct injury rate of 0.3%. Acute cholecystitis, gangrenous gallbladder, dense adhesions, subtotal cholecystectomy and conversion to open surgery were independently associated with morbidity.[7] The complication rate in the acute group of the present study was higher than the overall IAGES rate, possibly because the latter included a large proportion of elective procedures. However, the absence of major bile duct injury, reoperation and mortality in the present study supports an acceptable safety profile.

The mean hospital stay was significantly longer in acute cholecystitis than in chronic cholecystitis—3.2 versus 2.1 days. Acute cholecystitis independently increased hospital stay by approximately 0.86 days, whereas postoperative complications and conversion to open surgery increased it further. Kolla et al. reported that early laparoscopic cholecystectomy resulted in a substantially shorter total hospital stay than delayed surgery, despite the technical difficulty of operating during acute inflammation.[15] Agrawal et al. similarly concluded that early laparoscopic cholecystectomy was safe and avoided the repeated admission and extended treatment period associated with delayed management.[13] Thus, although postoperative stay following acute surgery may be longer than after elective surgery for chronic disease, definitive treatment during the index admission may still reduce total healthcare utilisation.

The study has several limitations. It included only 76 patients and was conducted at a single centre, limiting the precision and generalisability of the findings. The observational allocation of patients to acute and chronic groups introduced the possibility of selection bias. Only four conversions and 12 postoperative complications occurred; consequently, regression estimates for these outcomes had wide confidence intervals. Surgeon experience, exact timing from symptom onset to surgery and detailed intraoperative severity grading may also have influenced the outcomes. Larger multicentre prospective studies using standardised definitions of operative difficulty and 30-day follow-up are required.

Overall, the findings suggest that acute cholecystitis increases the technical difficulty and duration of laparoscopic cholecystectomy and prolongs postoperative recovery compared with chronic cholecystitis. However, it does not necessarily result in significantly higher conversion or major complication rates. With careful patient assessment, experienced surgical teams, adherence to the critical view of safety and timely use of bailout procedures, laparoscopic cholecystectomy remains a safe and effective treatment for both acute and chronic cholecystitis.

Conclusion

Laparoscopic cholecystectomy was safe and feasible in both acute and chronic cholecystitis. Acute cholecystitis was independently associated with greater operative difficulty, longer operative duration and prolonged hospital stay. However, conversion to open surgery and postoperative complication rates were not significantly different between the groups, and no major bile duct injury or mortality occurred.

Therefore, acute inflammation should not be considered a contraindication to laparoscopic cholecystectomy. With experienced surgical teams, adherence to the critical view of safety and timely use of bailout procedures, satisfactory clinical outcomes can be achieved in acute as well as chronic cholecystitis.

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Reference

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