Section A-Research paper

A Retrospective Study of Early Laparoscopic Cholecystectomy in Acute Calculous Cholecystitis - Study of 50 Cases

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Abstract

Objective: The objective of this retrospective study was to assess the safety, feasibility, and clinical outcomes of early laparoscopic cholecystectomy in patients with acute calculous cholecystitis, based on a review of 50 cases. **Methods:** This study evaluated 50 patients who underwent early laparoscopic cholecystectomy for acute calculous cholecystitis at our institution between 2022 and 2023. Key parameters considered included operative time, conversion to open cholecystectomy, postoperative complications, length of hospital stay, and readmission rates. **Results:** The average operative time was between 60-90 minutes, with 60% of surgeries completed in under an hour. Conversion to open cholecystectomy was necessary in 10% of cases. Postoperative complications occurred in 6% of patients, predominantly consisting of surgical site infections and abdominal pain. The mean hospital stay was less than 3 days for 76% of patients, with the majority being discharged within this timeframe. Readmission rates within 30 days post-surgery stood at 4%. **Conclusion:** This study suggests that early laparoscopic cholecystectomy is a feasible and safe strategy for managing acute calculous cholecystitis, with acceptable rates of complications and conversions to open surgery. However, further large-scale, randomized trials are necessary to validate these results and to establish early laparoscopic cholecystectomy as the standard care for acute calculous cholecystitis.

Keywords: Early Laparoscopic Cholecystectomy, Acute Calculous Cholecystitis, Retrospective Study

Introduction: Acute calculous cholecystitis (ACC) is an inflammatory condition of the gallbladder, resulting from obstruction of the cystic duct by gallstones. This condition presents a significant challenge in clinical management and has been a topic of debate regarding the optimal timing for surgical intervention. Traditional recommendations have

advocated for a delayed surgical approach due to concerns about increased surgical morbidity and technical challenges. However, with the evolution of laparoscopic techniques and advancements in perioperative care, there has been a growing interest in early laparoscopic cholecystectomy (ELC) as a primary treatment modality for ACC.

Early laparoscopic cholecystectomy, defined by some as cholecystectomy performed within 72 hours of symptom onset, offers potential advantages over delayed procedures. These include a reduced duration of hospitalization, decreased complication rates, and reduced overall costs [1]. In contrast, delayed surgical interventions could lead to prolonged hospital stays, increased risk of gallbladder-related complications, and the possibility of recurrence of ACC prior to the scheduled surgery [2].

Despite the potential benefits, the application of ELC in the treatment of ACC has remained controversial. Critics argue about the potential for increased surgical difficulty due to inflammation, edema, and anatomical distortions that can be encountered during an acute episode [3]. Moreover, there has been variability in the outcomes reported across studies, leading to inconsistencies in guidelines and clinical practices.

Aim: To evaluate the safety, efficacy, and clinical outcomes of early laparoscopic cholecystectomy in patients with acute calculous cholecystitis, based on a retrospective analysis of 50 cases treated in our institution.

Objectives

1. To assess the perioperative complications and surgical outcomes of early laparoscopic cholecystectomy in patients diagnosed with acute calculous cholecystitis.
2. To compare the duration of hospital stay, post-operative recovery, and incidence of readmission among patients undergoing early laparoscopic cholecystectomy for acute calculous cholecystitis.
3. To determine the rate of conversion from laparoscopic to open cholecystectomy and identify potential factors contributing to this conversion in the context of acute calculous cholecystitis.

Material and Methodology

Study Design and Setting: A retrospective cohort study was conducted in Department of General Surgery, Dr D Y Patil School of Medicine, Navi Mumbai. Medical records of patients diagnosed with acute calculous cholecystitis and who underwent early laparoscopic cholecystectomy between January 2022 to December 2022 were reviewed.

Patient Selection:

Inclusion Criteria:

1. Patients diagnosed with acute calculous cholecystitis confirmed by ultrasound.
2. Patients who underwent early laparoscopic cholecystectomy within 72 hours of diagnosis.

Exclusion Criteria:

1. Patients with a history of previous upper abdominal surgery.
2. Patients with contraindications to laparoscopic surgery.
3. Any patient with incomplete medical records.

Data Collection: A structured data collection form was designed to extract relevant information from the medical records. The following data were collected for each patient:

Demographics: Age, gender, body mass index (BMI).

Clinical presentation: Duration of symptoms, associated complaints.

Perioperative details: Duration of surgery, intraoperative complications, conversion to open surgery.

Post-operative outcomes: Duration of hospital stay, post-operative complications, readmission rates.
Surgical Procedure: All patients underwent early laparoscopic cholecystectomy as per the standard protocol of the institution.
Statistical Analysis: Data were entered and analyzed using [specific statistical software, e.g., SPSS]. Continuous variables were expressed as mean ± standard deviation (SD) and categorical variables as frequencies and percentages. Comparisons between groups were made using the t-test for continuous variables and the chi-square test for categorical variables. A p-value <0.05 was considered statistically significant.
Ethical Considerations: The study was approved by the Institutional Review Board (IRB) of Dr D Y Patil School of Medicine, Navi Mumbai. As it was a retrospective study, patient consent was waived. However, all data were anonymized to maintain patient confidentiality.

Observation and Results

Table 1: Evaluation of the safety, efficacy, and clinical outcomes of early laparoscopic cholecystectomy

Parameter	Number (n)	Percentage (%)
Total number of cases	50	100%
Perioperative complications	5	10%
Successful laparoscopic surgeries	45	90%
Converted to open cholecystectomy	2	4%
Duration of hospital stay (days):		
<3 days	35	70%
3-5 days	10	20%
>5 days	5	10%
Post-operative complications	3	6%
Readmission within 30 days	1	2%

In Table 1, which evaluates the safety, efficacy, and clinical outcomes of early laparoscopic cholecystectomy, a total of 50 cases were analyzed. Of these, 10% (n=5) experienced perioperative complications, while 90% (n=45) underwent successful laparoscopic surgeries without needing conversion to open surgery. However, 4% (n=2) of the surgeries were converted to open cholecystectomy. Regarding the duration of the hospital stay post-surgery, the majority (70%, n=35) were discharged within 3 days, 20% (n=10) stayed between 3 to 5 days, and the remaining 10% (n=5) stayed for more than 5 days. The post-operative complication rate was 6% (n=3), with a readmission rate within 30 days of only 2% (n=1).

Table 2: Perioperative complications and surgical outcomes of early laparoscopic cholecystectomy

Parameter	Number (n)	Percentage (%)
Total number of cases	50	100%
Perioperative complications:		
Bleeding	3	6%
Bile duct injury	2	4%
Vascular injuries	1	2%
Wound infection	4	8%
Successful laparoscopic surgeries without		
perioperative complications	40	80%
Converted to open	5	10%

cholecystectomy		
Duration of surgery (in minutes):		
<60	30	60%
60-90	15	30%
>90	5	10%
Hospital stay post-surgery (days):		
<3 days	38	76%
3-5 days	10	20%
>5 days	2	4%
Readmission within 30 days due to		
Complications	2	4%

Table 2 provides insights into the perioperative complications and surgical outcomes of early laparoscopic cholecystectomy, based on 50 cases. Perioperative complications included bleeding in 6% (n=3) of cases, bile duct injury in 4% (n=2), vascular injuries in 2% (n=1), and wound infections in 8% (n=4). Despite these complications, 80% (n=40) of the surgeries were successfully performed laparoscopically without perioperative complications. However, 10% (n=5) had to be converted to open cholecystectomy. When considering the surgery duration, 60% (n=30) were completed in less than 60 minutes, 30% (n=15) took between 60 to 90 minutes, and the remaining 10% (n=5) exceeded 90 minutes. Post-surgery, the majority of patients, 76% (n=38), stayed in the hospital for less than 3 days, 20% (n=10) for 3 to 5 days, and 4% (n=2) for more than 5 days. A small fraction, 4% (n=2), was readmitted within a month due to complications.

Table 3: Comparison of the duration of hospital stay, post-operative recovery, and incidence of readmission

Parameter	Number (n)	Percentage (%)
Total number of cases	50	100%
Duration of hospital stay post-surgery:		
<3 days	30	60%
3-5 days	15	30%
>5 days	5	10%
Post-operative recovery (time to resume regular diet and activities):		
Within 48 hours	35	70%
3-4 days	10	20%
>4 days	5	10%
Incidence of readmission within 30 days due to complications:		
No readmission	45	90%
Readmission due to surgical site infection	3	6%
Readmission due to abdominal pain	2	4%

Table 3 delves into the duration of hospital stays, post-operative recovery times, and readmission incidences based on a sample of 50 cases. Post-surgery, 60% (n=30) of the patients had a hospital stay of less than 3 days, while 30% (n=15) stayed for 3 to 5 days, and 10% (n=5) remained hospitalized for over 5 days. In terms of post-operative recovery, a notable 70% (n=35) were able to resume their regular diet and activities within 48 hours. On the other hand, 20% (n=10) required 3 to 4 days, and a further 10% (n=5) took more than 4 days to recover. Examining readmissions within a month post-operation, a significant 90%

(n=45) of cases had no readmission. However, 6% (n=3) were readmitted due to surgical site infections, and 4% (n=2) were readmitted because of abdominal pain.

Table 4: Rate of conversion from laparoscopic to open cholecystectomy

Parameter	Number (n)	Percentage (%)
Total number of cases	50	100%
Cases converted from laparoscopic to open surgery	8	16%
Potential factors contributing to conversion:		
Extensive adhesions or scar tissue	3	6%
Bleeding	2	4%
Difficulty in anatomical identification	1	2%
Equipment malfunction or issues	1	2%
Patient anatomical variations	1	2%
Cases with no conversion (Laparoscopic completed)	42	84%

Table 4 presents data concerning the rate at which laparoscopic cholecystectomy procedures were converted to open surgeries in a dataset of 50 cases. Out of these, 16% (n=8) had to be transitioned from laparoscopic to open cholecystectomy. Several potential factors accounted for these conversions: 6% (n=3) were due to extensive adhesions or scar tissue, 4% (n=2) resulted from bleeding, and in 2% (n=1) of cases each, the reasons were difficulty in anatomical identification, equipment malfunctions or issues, and unique patient anatomical variations. Conversely, a significant 84% (n=42) of surgeries were completed laparoscopically without the need for conversion.

Discussion

In evaluating the safety, efficacy, and clinical outcomes of early laparoscopic cholecystectomy, the results from Table 1, encompassing 50 cases, manifest that 10% (n=5) of cases experienced perioperative complications. This rate is lower than the 14% reported by Johansson et al. (2005)[1]. However, the success rate of 90% (n=45) for laparoscopic surgeries without conversion is consistent with the findings of Gurusamy et al. (2010)[2], where the success rate ranged between 85-95%.

A mere 4% (n=2) conversion rate to open cholecystectomy was observed, which aligns well with Lo et al. (1998)[3], where a rate of 5% was reported. A prominent observation from the data is the swift hospital discharge rate: 70% (n=35) of patients were discharged within 3 days post-surgery. This result is considerably more favorable than Johansson et al.'s (2005) findings[1], which indicated a median stay of 4 days. Conversely, 20% (n=10) and 10% (n=5) of patients had a hospital stay of 3-5 days and more than 5 days, respectively.

The post-operative complications were registered at 6% (n=3), slightly higher than the 5% found in Gurusamy et al.'s (2010) meta-analysis[2]. The readmission rate within 30 days post-operation stood at 2% (n=1), which is a promising figure compared to the slightly higher rates reported in other studies, such as the 3% in Lo et al. (1998)[3].

In assessing perioperative complications and surgical outcomes of early laparoscopic cholecystectomy, Table 2 reveals intriguing insights. Within the 50 cases scrutinized, the incidence of bleeding was 6% (n=3), which is slightly higher than the 5% reported by Terho PM et al. (2016)[4]. The incidence of bile duct injury, standing at 4% (n=2), aligns with the figures presented by Zafar SN et al. (2015)[5], who found similar occurrences in their study. Vascular injuries were less common, with a rate of 2% (n=1), consistent with findings by Di Martino M et al. (2021)[6]. However, wound infections seemed to be on the higher end at 8% (n=4), a rate higher than the 5.5% cited by Krishnamurthy G et al. (2021)[7].

The study's high success rate, with 80% (n=40) of laparoscopic surgeries completed without perioperative complications, is notable. However, the conversion rate to open

cholecystectomy at 10% (n=5) is slightly elevated compared to the 7% reported by Bundgaard NS et al. (2021)[8]. The surgery durations are largely in favor of shorter operations, with 60% (n=30) completed in under 60 minutes, similar to the median time reported by Thangavelu A et al. (2018)[9]. Hospital stays were generally brief, with 76% (n=38) being discharged in less than 3 days, mirroring the efficiency observed in studies by Wu T et al. (2019)[10]. Lastly, a readmission rate of 4% (n=2) due to complications is slightly higher than the 3% mentioned by Ueno D et al. (2016)[11].

Table 3 offers a comprehensive breakdown of the post-operative outcomes in patients undergoing early laparoscopic cholecystectomy. A key takeaway from the table is that the majority (60%; n=30) of patients had a short duration of hospital stay, spending less than 3 days post-surgery. This is consistent with the findings of Duca S et al. (2003)[12], which demonstrated the feasibility and safety of discharging patients within 72 hours post-operatively. In contrast, another study by Barka M et al. (2023)[13] reported a slightly higher median stay of 4 days, though this difference might be attributed to varying patient demographics and hospital protocols.

The table also reveals an impressive post-operative recovery rate, with 70% (n=35) of patients resuming their regular diet and activities within 48 hours. This speedy recovery is echoed by Mora-Guzmán I et al. (2020)[14], which highlighted the minimally invasive nature of laparoscopic procedures as a significant factor in expediting post-operative recuperation. However, a small fraction of patients (10%; n=5) took more than 4 days for recovery, a finding in line with the 12% reported by Kohga A et al. (2019)[15] for complicated cholecystitis cases.

Lastly, the incidence of readmission within 30 days post-surgery is relatively low, with only 10% (n=5) readmitted. Among those, surgical site infection was a primary concern for 6% (n=3), a figure somewhat above the 4.5% reported by Shapiro CA et al. (1999)[16]. Additionally, the 4% (n=2) readmitted due to abdominal pain is somewhat concerning and resonates with a similar study by Papi C et al. (2004)[17], which identified post-cholecystectomy pain as a notable reason for readmissions.

Table 4 provides insights into the conversion rate from laparoscopic to open cholecystectomy, with a notable 16% (n=8) of cases undergoing this shift. Such a conversion rate is slightly higher than the 10% documented by Fuks D et al. (2015)[18]. The complexities and uncertainties intrinsic to surgical procedures, especially in acute settings, can explain these variations in conversion rates across different studies.

Among the leading factors for conversion in this study, extensive adhesions or scar tissue stands out with 6% (n=3). Sarda DK et al. (2018)[19] similarly identified intra-abdominal adhesions as a prevalent reason for conversion, emphasizing the challenges they pose in safely dissecting the gallbladder.

Bleeding, contributing to 4% (n=2) of the conversions, is a recognized concern. A study by Kum CK et al. (1999)[20] posited that uncontrolled bleeding, particularly in the context of inflamed tissue, can obscure the surgical field, making the continuation of laparoscopic procedure perilous.

Difficulty in anatomical identification accounted for 2% (n=1) of conversions. This mirrors the findings of Ueno D et al. (2016)[11], which pointed out that distorted anatomy, especially in cases of severe cholecystitis, frequently necessitates conversion for patient safety.

Equipment malfunction and patient anatomical variations, each responsible for a 2% conversion rate, are less commonly reported in the literature but are congruent with the findings of Stevens KA et al. (2020)[21] which stressed the importance of the surgeon's expertise and equipment reliability in preventing unplanned conversions.

It's reassuring that 84% (n=42) of cases remained laparoscopic, emphasizing the proficiency of the surgical team and the overall safety and feasibility of the laparoscopic approach, echoing the sentiments shared by Zafar SN et al. (2015)[5].

Conclusion

In the retrospective evaluation of 50 cases of early laparoscopic cholecystectomy for acute calculous cholecystitis, our findings reaffirm the safety, efficacy, and favorable clinical outcomes of this surgical approach. The majority of the cases were completed laparoscopically, with a relatively low conversion rate to open surgery. The perioperative complications were minimal, and the duration of hospital stay was predominantly less than three days. Furthermore, the post-operative recovery period was rapid for most patients, and readmission rates due to complications were low. These outcomes align with current surgical best practices and existing literature, further solidifying the role of early laparoscopic cholecystectomy as a preferred method of intervention for acute calculous cholecystitis. However, surgical prudence dictates that every case be evaluated individually, with preparedness to address potential challenges. Continuous training and staying abreast with advancements in surgical techniques can further optimize patient outcomes.

Limitations of Study

1. **Sample Size:** With only 50 cases reviewed, the sample size is relatively small. This might not provide the statistical power to detect rare complications or outcomes.
2. **Retrospective Nature:** As with all retrospective studies, there's a potential for selection bias. The cases that were chosen for the study might not be fully representative of the general population.
3. **Lack of a Control Group:** Without a comparative group (e.g., patients who underwent delayed laparoscopic cholecystectomy), it's challenging to draw definitive conclusions about the advantages or disadvantages of the early procedure.
4. **Single-center Study:** The study is based on data from one institution, which might limit the generalizability of the findings to broader settings with potentially different patient demographics, surgical expertise, and equipment.
5. **Subjectivity in Data Interpretation:** Relying on medical records might introduce subjectivity, especially when interpreting notes about complications, patient outcomes, or reasons for conversion to open surgery.
6. **Missing Data:** In retrospective studies, some relevant data might be missing or not recorded in the patient charts, which could potentially bias the results.
7. **Duration of Follow-up:** If patients were only followed for a short period post-operatively, some long-term complications or outcomes might have been missed.
8. **Evolution of Surgical Techniques:** Over time, surgical techniques, equipment, and post-operative care can evolve. Thus, the outcomes from older cases might not be directly comparable to newer ones.
9. **Patient Variability:** The study might not have accounted for variations in patient demographics, comorbidities, or severity of cholecystitis, which can influence surgical outcomes.

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