

LONG-TERM OUTCOMES OF LAPAROSCOPIC VS. OPEN CHOLECYSTECTOMY IN PATIENTS WITH GALLSTONE DISEASE: A RETROSPECTIVE COHORT STUDY

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Abstract

Background: Gallstone disease often requires surgical treatment, with Laparoscopic Cholecystectomy (LC) and Open Cholecystectomy (OC) being common approaches. LC, a minimally invasive option, is known for potentially shorter hospital stays and lower morbidity rates. In contrast, OC follows a traditional open method, potentially differing in operation time, hospital stay, morbidity rates, procedural specifics, hospital charges, conversion rates, postoperative complications, patient recovery times, long-term outcomes, and patient satisfaction. This retrospective cohort study compared Laparoscopic Cholecystectomy (LC) and Open Cholecystectomy (OC) in 100 patients each. **Materials and Methods:** We assessed operation time, hospital stay, morbidity rate, procedural details, hospital charges, conversion rate, postoperative complications, patient recovery time, long-term outcomes, and patient satisfaction. **Result:** LC had a longer operation time, shorter hospital stay, and lower morbidity rate. OC showed higher cholangiography and drain usage. LC incurred higher hospital charges. Both groups experienced postoperative complications, with LC patients recovering faster. Long-term outcomes were positive, and patients reported high satisfaction. **Conclusion:** LC presents advantages, including shorter hospital stays and lower morbidity rates, making it a safe alternative for gallstone disease management.

INTRODUCTION

Gallstone disease is a prevalent gastrointestinal ailment affecting millions of individuals worldwide. It often necessitates surgical intervention to alleviate symptoms and complications associated with gallstones. Among the surgical approaches available, Laparoscopic Cholecystectomy (LC) and Open Cholecystectomy (OC) are the two primary methods employed for gallstone removal.^[1]

LC, introduced in the late 1980s, revolutionized gallbladder surgery with its minimally invasive approach. This technique involves making small incisions in the abdomen and using a laparoscope to visualize and remove the gallbladder. LC gained popularity rapidly due to several potential benefits, including reduced postoperative pain, shorter

hospital stays, faster recovery, and improved cosmetic outcomes.^[2,3] Moreover, LC has been associated with lower morbidity rates, making it an attractive option for gallstone disease management.^[4] In contrast, OC follows the conventional open surgical approach, involving a larger abdominal incision to access and remove the gallbladder. Although OC has a longer history and established track record, it is often perceived as more invasive and may entail longer hospital stays and recovery periods.^[5,6] Nevertheless, OC remains a relevant and widely utilized technique, particularly in cases where LC is not feasible or safe.

The choice between LC and OC is influenced by various factors, including the patient's medical condition, the surgeon's expertise, and institutional preferences. Both procedures have their merits and

demerits, and the decision-making process can be complex.^[7]

Given the significance of gallstone disease and the diverse surgical approaches available, it is imperative to conduct a thorough evaluation of the outcomes associated with LC and OC. This retrospective cohort study aims to provide a comprehensive and evidence-based comparison of these two surgical methods in the context of gallstone disease management.

Aim and Objectives:

The primary aim of this study is to compare the outcomes of Laparoscopic Cholecystectomy (LC) and Open Cholecystectomy (OC) in patients with gallstone disease. Specifically, we seek to assess the following aspects:

Operation Time: We aim to determine the mean operation time for LC and OC procedures, providing insights into the efficiency of each method.

Hospital Stay Duration: Our objective is to analyze the average duration of hospital stays for patients undergoing LC and OC, elucidating the impact on the healthcare system and patient recovery.

Morbidity Rate: We will evaluate and compare the morbidity rates between LC and OC groups, examining the safety profiles of these procedures.

Procedural Details: This study will investigate procedural specifics, including the utilization of cholangiography and drains, shedding light on the technical aspects of LC and OC.

Hospital Charges: We aim to assess the financial implications of LC and OC by analyzing the mean hospital charges associated with each procedure.

Conversion Rate: Our objective is to determine the rate at which laparoscopic procedures (LC) need to be converted to open surgery (OC), providing insights into the feasibility and challenges of laparoscopy.

Postoperative Complications: We will document and compare the types and rates of postoperative complications encountered in LC and OC groups, offering a comprehensive view of the risks associated with each procedure.

Patient Recovery Time: Our study seeks to provide information on the time it takes for patients to recover and return to their normal activities after LC and OC.

Long-Term Outcomes: We aim to assess the incidence of long-term complications or recurrence of symptoms in both LC and OC groups, evaluating the durability of each procedure's benefits.

Patient Satisfaction: This study will explore patient satisfaction levels following LC and OC, considering the subjective experiences and outcomes that matter most to patients.

MATERIALS AND METHODS

Study Location: The study was conducted at SVS Medical College, Mahabubnagar, a tertiary care healthcare institution known for its advanced surgical facilities and a diverse patient population.

Study Period: Data collection encompassed the period from September 1, 2022, to August 31, 2023, allowing for a comprehensive analysis of patient outcomes and seasonal variations.

Study Design: This retrospective cohort study involved an in-depth analysis of medical records and data from 200 patients who underwent either Laparoscopic Cholecystectomy (LC) or Open Cholecystectomy (OC) for gallstone disease. The study design aimed to elucidate the comparative effectiveness of these surgical approaches.

Sample Selection: A meticulous selection process identified 100 patients in each group (LC and OC) based on stringent inclusion and exclusion criteria, ensuring a representative sample of gallstone disease cases.

Inclusion Criteria

Patients diagnosed with gallstone disease.

Patients who underwent either Laparoscopic Cholecystectomy (LC) or Open Cholecystectomy (OC).

Availability of complete medical records.

Exclusion Criteria

Patients with concurrent major illnesses unrelated to gallstone disease.

Patients with incomplete or missing medical records.

Patients who underwent alternative surgical procedures for gallstone disease.

Data Collection: Data were meticulously extracted from electronic health records (EHRs), surgical logs, and hospital databases. This encompassed comprehensive patient demographics, detailed medical histories, surgical specifics, and exhaustive postoperative outcome records. Data collection was carried out by a team of trained research personnel to guarantee accuracy and consistency.

Statistical Analysis: Advanced statistical software was employed for data analysis. In addition to fundamental descriptive statistics, such as means, percentages, and standard deviations, a multifaceted comparative analysis was executed to scrutinize and quantify disparities between the LC and OC groups for an extensive array of study parameters.

Ethical Considerations: The study meticulously adhered to stringent ethical guidelines and procured explicit approval from the Institutional Review Board (IRB) of SVS Medical College. Stringent measures were in place to safeguard patient confidentiality, and data privacy was rigorously upheld throughout the study.

RESULTS

Study Demographics: 100 patients were included in each group, one undergoing Laparoscopic Cholecystectomy (LC) and the other Open Cholecystectomy (OC) [Table 1].

Operation Time LC procedures had a mean duration of 110-130 minutes, whereas OC took 70-90 minutes on average [Table 2].

Hospital Stay Duration: Patients in the LC group typically stayed in the hospital for 1-3 days, whereas those in the OC group had longer stays of 4-6 days on average [Table 3].

Morbidity Rate; LC had a lower morbidity rate of 2-4% compared to OC with a rate of 6-8% [Table 4].

Procedural Details: Cholangiography was less frequently used in LC (25%-35%) compared to OC (80%-90%), and drain usage was also lower in LC (5%-15%) compared to OC (10%-20%) [Table 5].

Hospital Charges: LC procedures were associated with higher hospital charges, ranging from ₹50,000-₹70,000, while OC had lower costs in the range of ₹30,000-₹50,000 [Table 6].

Conversion Rate: The conversion rate from LC to OC was observed to be 10%-15% [Table 7].

Postoperative Complications: Postoperative complications in LC included infection, bleeding, bile duct injury, and wound complications, while OC had complications such as infection, bleeding, hernia, and bile duct injury [Table 8].

Patient Recovery Time: Patients who underwent LC typically recovered in 1-2 weeks, whereas OC patients had a longer recovery time of 2-4 weeks [Table 9].

Long-Term Outcomes and Patient Satisfaction: Long-term outcomes included lower recurrence rates of gallstone-related issues and improved quality of life in both groups. Patient satisfaction was generally high, with patients experiencing relief from gallstone symptoms following surgery. please write results section for academic journal more elaborately [Table 10].

Table 1: Study Demographics

Parameter	Laparoscopic Cholecystectomy (LC)	Open Cholecystectomy (OC)
Total Patients	100	100
Group Assignment	LC	OC

Table 2: Operation Time

Procedure Type	Mean Operation Time (minutes)
Laparoscopic Cholecystectomy (LC)	110-130
Open Cholecystectomy (OC)	70-90

Table 3: Hospital Stay Duration

Procedure Type	Average Hospital Stay (days)
Laparoscopic Cholecystectomy (LC)	1-3
Open Cholecystectomy (OC)	4-6

Table 4: Morbidity Rate

Procedure Type	Morbidity Rate (%)
Laparoscopic Cholecystectomy (LC)	2-4
Open Cholecystectomy (OC)	6-8

Table 5: Procedural Details

Procedure Type	Cholangiography Usage (%)	Drain Usage (%)
Laparoscopic Cholecystectomy (LC)	25% - 35%	5% - 15%
Open Cholecystectomy (OC)	80% - 90%	10% - 20%

Table 6: Hospital Charges

Procedure Type	Mean Hospital Charges (₹)
Laparoscopic Cholecystectomy (LC)	50,000-70,000
Open Cholecystectomy (OC)	30,000-50,000

Table 7: Conversion Rate

Conversion Rate (%)
10-15

Table 8: Postoperative Complications

Procedure Type	Nature of Complications
Laparoscopic Cholecystectomy (LC)	Infection, bleeding, bile duct injury, wound complications.
Open Cholecystectomy (OC)	Infection, bleeding, hernia, bile duct injury.

Table 9: Patient Recovery Time

Procedure Type	Recovery Time (weeks)
Laparoscopic Cholecystectomy (LC)	1-2
Open Cholecystectomy (OC)	2-4

Table 10: Long-Term Outcomes and Patient Satisfaction

Parameter	Observations
Long-Term Outcomes	Low recurrence rates of gallstone-related issues, improved quality of life.

DISCUSSION

Comparative Effectiveness of LC and OC: Laparoscopic Cholecystectomy (LC), as a minimally invasive surgery, has demonstrated several advantages in managing gallstone disease, including shorter hospital stays, lower morbidity rates, and cost-effectiveness (Kim et al, Loh et al).^[8,9] These benefits align with the global trend towards minimally invasive techniques, which are preferred for their quicker recovery times and reduced postoperative discomfort (Aitken et al). The efficiency of LC in terms of shorter hospitalization can lead to cost savings and more efficient utilization of healthcare resources (Kalata et al).^[10-15]

Balancing Advantages of LC and OC: Despite LC's advantages, Open Cholecystectomy (OC) remains relevant, particularly due to its shorter operation times and greater use of cholangiography and drains, suggesting a higher level of surgical comfort with this method (Kamarajah et al).^[10] The choice between LC and OC should be personalized, considering factors like disease severity, patient health, and surgeon expertise (Han et al).^[11]

Regional Variations in Outcomes: Significant regional variations in long-term outcomes and patient satisfaction with these surgical methods have been noted, particularly in India. This highlights the diversity in healthcare delivery, affected by factors such as the availability of skilled surgeons and healthcare infrastructure (Ranjan et al, Ko-iam et al).^[12,13] Understanding these regional differences is crucial for improving treatment efficacy and patient well-being in various healthcare contexts.

Patient-Centered Care: Emphasizing patient-reported outcomes and quality of life post-surgery is critical for a more comprehensive assessment of the effectiveness of LC and OC (Han et al).^[11] Patient-centered care, which prioritizes the patient's experience and perspective, is essential for enhancing satisfaction and overall health outcomes.

Implications for Clinical Practice: The insights from these comparative studies of LC and OC are invaluable for clinical practice. They help clinicians in making informed treatment decisions, tailored to individual patient needs. Acknowledging the necessity for personalized care, weighing the benefits of each surgical method, and considering regional variations and patient preferences are fundamental for optimal care in gallstone disease management (Kamarajah et al, Ko-iam et al).^[10,12]

Limitations: The study's limitations include varied surgical expertise impacting LC and OC outcomes, regional disparities in healthcare across India, potential patient selection bias, a focus on short-term rather than long-term outcomes, and a lack of comprehensive data on patient-reported outcomes. These factors can influence the effectiveness and applicability of the findings, highlighting the need for

caution in generalizing the results to different healthcare settings and patient populations.

Future Research: Future research should focus on understanding long-term outcomes and patient satisfaction in diverse healthcare settings across India. Comparative studies examining regional variations in healthcare and their impact on LC and OC effectiveness are needed. Additionally, more emphasis on patient-reported outcomes, including post-surgery quality of life, is crucial. Research should also explore ways to enhance accessibility and effectiveness of both surgical methods in varied healthcare environments.

CONCLUSION

In our study both Laparoscopic Cholecystectomy (LC) and Open Cholecystectomy (OC) offer distinct advantages for gallstone disease management. Treatment decisions should be individualized, considering factors like disease severity, patient health, and surgeon expertise. The study recognizes the variability in outcomes due to regional healthcare differences and patient demographics, emphasizing a balanced approach that weighs the benefits and limitations of each surgical method in different clinical scenarios.

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