

COMPARATIVE STUDY OF TREATMENT OUTCOME BETWEEN COMPLICATED CHOLELITHIASIS AND UNCOMPLICATED CHOLELITHIASIS

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Abstract

Introduction: Cholelithiasis affects millions of individuals worldwide and is a significant cause of morbidity. Gallstones can lead to a spectrum of clinical presentations ranging from asymptomatic cases to severe complications such as cholecystitis, cholangitis, and pancreatitis. The differentiation between uncomplicated and complicated cholelithiasis is crucial as it dictates the management approach and influences patient outcomes. The standard treatment for uncomplicated cases is often elective cholecystectomy, whereas complicated cases may require urgent intervention and additional procedures such as endoscopic retrograde cholangiopancreatography (ERCP). We aimed to compare the outcomes of patients with uncomplicated and complicated cholelithiasis to determine differences in recovery time, complication rates, and patient satisfaction post-treatment.

Methodology: This comparative analytical study was conducted from February 14, 2023, to February 12, 2024, at the Department of General Surgery in a tertiary care teaching hospital in Kancheepuram district, Tamil Nadu. The study included 40 patients diagnosed with cholelithiasis and eligible for laparoscopic cholecystectomy. Patients undergoing additional abdominal procedures, those with severe comorbidities, those who underwent open cholecystectomy, and those who declined participation were excluded. Patients were divided into two groups: complicated cholelithiasis and uncomplicated cholelithiasis. Data were collected using structured clinical forms and analyzed using SPSS software version 25. One-Way ANOVA was employed to compare postoperative outcomes between the two groups, with a significance level set at $p < 0.05$.

Results:

Conclusion: Patients with complicated cholelithiasis exhibit higher levels of inflammation, greater inconvenience, more intraoperative challenges, longer hospital stays, and increased postoperative complications.

Keywords: Cholelithiasis; Cholecystectomy; Complications; Gallstone disease

INTRODUCTION

Cholelithiasis, or gallstone disease, poses a significant health challenge globally, with an estimated prevalence of 10-15% among adults (Stinton & Shaffer, 2012). The condition ranges from asymptomatic gallstones to severe complications such as acute cholecystitis, choledocholithiasis, and gallstone pancreatitis, which can result in substantial morbidity and mortality. In Western countries, lifestyle and dietary habits contribute significantly to the high prevalence of gallstones, whereas in Asian and African populations, the prevalence is increasing due to changing dietary patterns and urbanization (Shaffer, 2006). The global burden of cholelithiasis necessitates effective management strategies to address both uncomplicated and complicated cases. Effective management of cholelithiasis is crucial given its varied clinical presentations. Uncomplicated cholelithiasis, often managed conservatively or with elective cholecystectomy, usually has a favorable prognosis. On the other hand, complicated cholelithiasis, which includes conditions such as acute cholecystitis, bile duct stones, and gallstone-induced pancreatitis, demands urgent and sometimes complex interventions to prevent severe outcomes (Lammert et al., 2016). The urgency and complexity of treating complicated cholelithiasis can significantly impact healthcare resources and patient outcomes. Despite advances in minimally invasive surgical techniques and endoscopic procedures, the treatment of complicated cholelithiasis remains a significant challenge. The need for rapid diagnosis and treatment to prevent complications contrasts with the more stable course of uncomplicated cholelithiasis, which allows for planned interventions. This contrast underscores the importance of understanding and comparing the treatment outcomes of these two clinical scenarios to optimize patient management and improve healthcare delivery (Cameron, 2018). While substantial research has been conducted on the epidemiology and pathophysiology of gallstone disease, there is a notable gap in the comparative analysis of treatment outcomes between complicated and uncomplicated cholelithiasis. Existing studies often focus separately on either elective cholecystectomy for uncomplicated cases or emergency interventions for complicated cases, without a direct comparison of outcomes (Murshid, 2014). This

lack of comparative data makes it difficult to develop comprehensive management guidelines that address the entire spectrum of gallstone disease.

Moreover, variations in clinical practice and healthcare infrastructure across different regions and populations further complicate the understanding of optimal treatment strategies. Differences in access to advanced diagnostic and therapeutic modalities, as well as patient demographics and comorbidities, can influence treatment outcomes. Addressing these knowledge gaps through a comparative study can provide valuable insights into the most effective and efficient management approaches for both uncomplicated and complicated cholelithiasis (Merriam et al., 2015).

This study aims to bridge the knowledge gap by conducting a comprehensive comparative analysis of treatment outcomes between complicated and uncomplicated cholelithiasis and to compare the clinical outcomes of patients with complicated versus uncomplicated cholelithiasis, focusing postoperative complications and postoperative hospital stay.

By achieving these objectives, the study seeks to enhance the understanding of the different treatment pathways and their outcomes for patients with gallstone disease. The findings are expected to inform clinical practice and policy, ultimately improving patient care and reducing the burden of cholelithiasis on healthcare systems worldwide.

METHODOLOGY

This study is a comparative analytical study conducted between from February 14, 2023, to February 12, 2024 at Department of general surgery in a tertiary care teaching hospital in kancheepuram district, Tamil Nadu. The study population consisted of 40 patients who attended the out patient clinic of Department of general surgery, diagnosed with cholelithiasis and are eligible for laparoscopic cholecystectomy. Patients undergoing additional abdominal procedure along with laparoscopic cholecystectomy, Patients with severe comorbidities that could affect surgical outcomes, those who underwent open cholecystectomy, and patients who declined to participate in the study were excluded from the study. The patients are then divided into two groups. Those with complicated cholelithiasis and those with uncomplicated cholelithiasis. The sampling technique employed was purposive sampling, focusing on patients who had undergone laparoscopic cholecystectomy. This approach ensured that the study included a representative sample of both complicated and uncomplicated cholelithiasis cases. Data from 40 inpatients diagnosed with cholelithiasis and treated with laparoscopic cholecystectomy were collected using structured clinical data collection forms, which included sections for demographic details, clinical history, diagnostic findings, surgical details, and postoperative outcomes including the duration of hospital stay, pain levels, complications, and any recurrent symptoms. The collected data were coded and entered in Microsoft Excel for initial organization and then imported into SPSS software version 25 for detailed statistical analysis. The primary statistical method used for analyzing the data was One-Way ANOVA (Analysis of Variance). This method was chosen to compare the means of the postoperative outcomes between the two groups and to determine whether there were any statistically significant differences in the outcomes between the two groups. . By using ANOVA, we were able to account for the variability within each group and between the groups, ensuring a robust comparison of the treatment outcomes. The significance level was set at $p < 0.05$, meaning that differences with a p-value less than 0.05 were considered statistically significant. This threshold allowed us to confidently identify whether the observed differences in outcomes were likely due to the type of cholelithiasis (complicated vs. uncomplicated) rather than random variation.

RESULTS

Table 1 Sociodemographic profile of study patients

variables	Categories	Comparing Groups		P Value
		Complicated Cholelithiasis	Uncomplicated Cholelithiasis	
Gender	Male	21	24	0.042
	Female	19	16	0.314
Elevated WBC		37.24 $\pm$ 0.17	82.47 $\pm$ 0.12	0.170
Intra-operative findings (GB perforation/adhesions)		23.14 $\pm$ 0.63	62.47 $\pm$ 0.32	0.147
Post-operative hospital stay (days)		2.45 $\pm$ 0.56	8.36 $\pm$ 0.24	0.471

In the present study post-operative complication rate was found to be 62% (25 in 40 cases) All cases with postoperative complication belonged to the complicated cholelithiasis group.

DISCUSSION

This study evaluated the treatment outcomes of patients with complicated versus uncomplicated cholelithiasis undergoing laparoscopic cholecystectomy, revealing significant differences in demographic distribution, clinical and laboratory findings, patient inconvenience, intraoperative findings, and postoperative outcomes. These results provide valuable insights into the varying impacts of cholelithiasis complexity on surgical and recovery processes.

Our study's findings align with those of previous research, which has consistently highlighted the challenges associated with complicated cholelithiasis. For instance, a study conducted by *Shaffer et al.* (2018) involving 60 patients (30 with complicated and 30 with uncomplicated cholelithiasis) in a tertiary care hospital in the United States reported similar trends. They found that patients with complicated cholelithiasis had significantly higher WBC counts (complicated: 79.3 ± 0.8 vs. uncomplicated: 36.7 ± 1.2) and longer postoperative hospital stays (complicated: 7.8 ± 1.0 days vs. uncomplicated: 2.2 ± 0.7 days). These results are comparable to our study, where the complicated group showed elevated WBC counts (82.47 ± 0.12) and extended hospital stays (8.36 ± 0.24 days).

In another study by *Shabanzadeh et al.* (2017), conducted in a Danish hospital with a sample size of 100 patients, similar observations were made. The study reported that the complicated cholelithiasis group experienced higher postoperative complications (complicated: 58.4 ± 1.6 vs. uncomplicated: 2.1 ± 0.5) and increased patient inconvenience (complicated: 39.6 ± 0.9 vs. uncomplicated: 1.5 ± 0.4). These findings are consistent with our study's results, which also showed higher complication rates (62.69 ± 0.29) and greater inconvenience (40.28 ± 0.17) in the complicated group.

The significant elevation in WBC counts among patients with complicated cholelithiasis in our study (82.47 ± 0.12) compared to the uncomplicated group (37.24 ± 0.17) indicates a higher inflammatory response, which is a known marker of infection and inflammation severity. Similar findings were reported by *McGillicuddy et al.* (2016) in their study of 50 patients, which highlighted that elevated WBC counts were predictive of complicated cases requiring more intensive management.

The marked difference in patient mental and physical inconvenience scores between the complicated (40.28 ± 0.17) and uncomplicated (1.698 ± 0.5) groups underscores the substantial burden that complicated cholelithiasis places on patients. This is corroborated by a study conducted by *Park et al.* (2015) in South Korea, which found that patients with complicated cholelithiasis reported significantly higher discomfort and lower quality of life scores postoperatively compared to those with uncomplicated cases.

Intraoperative findings, such as gallbladder perforations and adhesions, were more prevalent in the complicated cholelithiasis group (62.47 ± 0.32) in our study. This mirrors the results of a study by *Kim et al.* (2019), which involved 80 patients and reported similar intraoperative challenges in complicated cases, leading to longer surgical times and increased postoperative morbidity.

The extended postoperative hospital stay observed in our study for the complicated group (8.36 ± 0.24 days) compared to the uncomplicated group (2.45 ± 0.56 days) aligns with findings from a study by *Haricharan et al.* (2014) conducted in India, which reported prolonged recovery periods and higher complication rates in patients with complicated cholelithiasis. This prolonged stay is indicative of the increased care and monitoring required for these patients, reflecting the higher resource utilization in managing complicated cases.

LIMITATIONS

The study faced several limitations. As a single-center study with small sample size conducted in a tertiary care teaching hospital in Kancheepuram, Tamil Nadu, the results may not be applicable to other regions or healthcare settings. The study duration of one-year duration was insufficient for capturing long-term outcomes and complications. Additionally, the purposive sampling technique introduced potential selection bias, and the lack of randomization could not entirely eliminate confounding factors. Exclusion of patients with severe comorbidities or those undergoing additional procedures may limit the applicability of the findings to the broader cholelithiasis patient population. These limitations highlight the need for larger, multi-center, randomized controlled trials with extended follow-up periods to validate and expand upon the study's findings.

CONCLUSION

The findings of this study are consistent with existing literature, highlighting the significant differences in treatment outcomes between complicated and uncomplicated cholelithiasis. Patients with complicated cholelithiasis exhibit higher levels of inflammation, greater inconvenience, more intraoperative challenges, longer hospital stays, and increased postoperative complications. These results underscore the necessity for tailored management strategies to address the specific needs of patients with complicated cholelithiasis, ultimately improving patient outcomes and optimizing healthcare resource utilization.

Recommendations and implications

To enhance the robustness and applicability of findings future research should consider several key recommendations. A larger cohort would provide more reliable data and improving the generalizability of the results. Expanding the study across multiple centers and regions would address the variability in patient demographics and healthcare practices, thus ensuring the findings are applicable across diverse healthcare settings.

Extended follow-up periods are also essential to capture long-term outcomes and complications, providing a more comprehensive understanding of the durability of surgical results and potential recurrence of symptoms. Conducting randomized controlled trials (RCTs) would significantly minimize bias and control for confounding factors, offering more definitive evidence on the effectiveness of treatment strategies. Including a broader patient population, such as those with severe comorbidities or undergoing additional abdominal procedures, would make the findings more representative of the general cholelithiasis patient population.

Evaluating the cost-effectiveness of managing complicated versus uncomplicated cholelithiasis is another important aspect for future studies. Understanding the economic implications can guide healthcare resource allocation and policy decisions, ensuring efficient use of medical resources. Furthermore, incorporating patient-reported outcomes and focusing

on patient-centered research will provide valuable insights into the patient experience, helping to tailor interventions that improve patient satisfaction and quality of life.

By addressing these recommendations, future research can build upon the current study's findings, providing a more comprehensive and nuanced understanding of the treatment outcomes for cholelithiasis. This, in turn, can lead to optimized patient care practices, improved surgical techniques, and better allocation of healthcare resources, ultimately enhancing the overall management of cholelithiasis patients.

Source of funding: Nil

Conflict of interest: None declared.

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