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Original Research Article

Intraoperative Findings of Elective Laparoscopic Cholecystectomy: A Comparative Study Between Diabetic and Non-Diabetic Patients

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Abstract:

Background: Laparoscopic cholecystectomy (LC) is the gold standard treatment for symptomatic gallstone disease. However, managing diabetic patients poses unique challenges due to the systemic effects of diabetes, including altered gallbladder motility, increased inflammation, and delayed wound healing. Understanding the intraoperative findings and outcomes of LC in diabetic patients is crucial for improving surgical care in this population.

Aim: To assess how diabetes affects surgical complexity and recovery, as well as to compare the intraoperative findings and results of laparoscopic cholecystectomy in patients with and without diabetes.

Methods: This prospective comparative study was conducted at Rani Durgavati Medical College, Banda, Uttar Pradesh, India, over two years, including 60 patients (30 diabetics and 30 non-diabetics). Data were collected on demographic characteristics, intraoperative findings (operative time, gallbladder wall thickness, adhesions, bile spillage), and postoperative outcomes (hospital stay, wound infections, complications). Statistical analysis was performed using SPSS version 23.0, with significance set at $p < 0.05$.

Results: Diabetic patients had significantly longer operative times (75.2 ± 10.5 minutes vs. 65.3 ± 9.8 minutes, $p < 0.001$) and thicker gallbladder walls (4.8 ± 0.6 mm vs. 3.6 ± 0.5 mm, $p < 0.001$). Adhesions (60% vs. 27%, $p = 0.012$) and bile spillage (40% vs. 13%, $p = 0.005$) were more frequent in diabetics. Postoperative hospital stays were longer in diabetics (3.8 ± 1.2 days vs. 2.5 ± 0.8 days, $p < 0.001$), and patient satisfaction scores were lower (7.2 ± 1.5 vs. 8.4 ± 1.2, $p = 0.021$).

Conclusion: Diabetic patients undergoing laparoscopic cholecystectomy exhibit increased surgical complexity and prolonged recovery times compared to non-diabetics. Despite these challenges, LC remains a safe and effective procedure for diabetic patients with appropriate perioperative management.

Recommendations: Optimizing preoperative glycemic control, enhancing intraoperative techniques, and implementing tailored postoperative care protocols can improve outcomes for diabetic patients undergoing LC. Future studies should explore the role of advanced surgical technologies and protocols in mitigating the challenges observed in diabetic populations.

Keywords: Diabetes mellitus, laparoscopic cholecystectomy, gallstone disease, intraoperative findings, postoperative outcomes.

Introduction

(LC) is considered the gold standard for treating symptomatic cholelithiasis since it is less intrusive than open cholecystectomy, causes less pain after surgery, and requires less time in the hospital. It has revolutionized the management of gallstone disease, making it a routine surgical procedure globally [1]. However, its outcomes in diabetic patients remain a matter of clinical concern due to the systemic implications of diabetes mellitus (DM) on surgical outcomes.

A chronic metabolic disease that impacts several organ systems is DM. It predisposes individuals to gallstone formation through mechanisms such as altered bile composition, impaired gallbladder motility, and autonomic neuropathy [2]. Consequently, diabetic patients are more likely to undergo cholecystectomy during their lifetime. However, DM is also associated with increased risks during surgery, including infections, delayed wound healing, and prolonged recovery periods [3]. These factors make the surgical management of gallstone disease in diabetics more complex compared to non-diabetic individuals.

Several recent studies have investigated the intraoperative and postoperative outcomes of LC in diabetic patients. In a study it was reported that diabetic patients undergoing LC had increased gallbladder wall thickness, more adhesions, and prolonged operative times compared to non-diabetic patients [4]. Similar results were found in a study, which emphasized the necessity of careful surgical planning and improved perioperative care for diabetic patients having LC [5].

Despite these challenges, LC remains a preferred procedure in diabetic patients due to its safety profile and benefits over open cholecystectomy. A multicenter study in 2022 confirmed that LC in diabetic patients resulted in lower postoperative complication rates compared to open surgery, provided there was adequate preoperative glycemic control [6]. Furthermore, the results of LC in diabetic populations have improved due to developments in surgical methods and perioperative care. The aim of the study is to assess how diabetes affects surgical complexity and recovery, as well as to compare the intraoperative findings and results of laparoscopic cholecystectomy in patients with and without diabetes.

Methodology

Study Design: This study is a prospective comparative observational study.

Study Setting: The study was conducted at Rani Durgavati Medical College, Banda, Uttar Pradesh, India. The study spanned a duration of two years, ensuring a comprehensive evaluation of cases.

Participants: A total of 60 patients undergoing elective LC were included in the study. These participants were divided into two groups: 30 diabetic patients and 30 non-diabetic patients.

1. Patients aged 18–65 years undergoing elective LC.
2. Diagnosed diabetics with controlled blood sugar levels (for diabetic group).
3. Non-diabetics with no history of diabetes or prediabetes (for non-diabetic group).

Exclusion Criteria:

- Patients with acute cholecystitis, cholangitis, or gallbladder malignancy.
- Uncontrolled diabetes or other systemic diseases posing surgical risks.
- History of previous upper abdominal surgery.
- Pregnancy or lactation.

Bias: Random sampling was used for participant recruitment in order to reduce selection bias. Data collection and intraoperative findings were recorded by blinded observers who were unaware of the patients' diabetic status.

Data Collection: Demographic details, medical history, and preoperative investigations were recorded for each participant. Intraoperative findings, including gallbladder wall thickness, adhesions, bile spillage, and difficulty level of the procedure, were meticulously documented. Data collection was standardized using predesigned proformas.

Procedure: Experienced laparoscopic surgeons used established procedures to complete every surgery. Patients were preoperatively evaluated for fitness for laparoscopic surgery. Intraoperative findings such as gallbladder morphology, adhesions, and the time required for surgery were assessed and recorded for both groups.

Statistical Analysis: SPSS version 23.0 was used to analyze the data. For continuous variables, descriptive statistics like mean and standard deviation were computed. Percentages were used to represent categorical variables. Continuous variables were compared between groups using the independent t-test, and categorical data were compared using the chi-square test. P-values less than 0.05 were regarded as statistically noteworthy.

Results

The study included 60 patients, 30 of whom were diabetes and 30 of whom were not. The mean age was greater in the diabetic group (55.3 ± 8.2 years) than in the non-diabetic group (50.6 ± 7.9 years), with a statistically significant difference (p=0.032). Additionally, diabetic patients' BMI (28.4 ± 2.6 kg/m2) was substantially higher than non-diabetics' (26.8 ± 2.3 kg/m2, p=0.045). The distribution of genders in the groups was similar. **Table 1** provides specifics on these traits.

Table 1: Baseline Characteristics of Participants

Parameter	Diabetic Group (n=30)	Non-Diabetic Group (n=30)	p-value
Age (years)	55.3 ± 8.2	50.6 ± 7.9	0.032
Gender (Male/Female)	18/12	16/14	0.612
BMI (kg/m^2)	28.4 ± 2.6	26.8 ± 2.3	0.045

The diabetic group exhibited significantly more challenging surgical conditions, as shown in **Table 2**. The operative time was longer in diabetics (75.2 ± 10.5 minutes) compared to non-diabetics (65.3 ± 9.8 minutes, p<0.001). Gallbladder wall thickness was greater in diabetics (4.8 ± 0.6 mm vs. 3.6 ± 0.5 mm, p<0.001). The amount of adhesions was higher in diabetics (60%) than in non-diabetics (27%, p=0.012). Bile spillage was also higher in diabetics (40% vs. 13%, p=0.005).

Table 2: Intraoperative Findings

Parameter	Diabetic Group (n=30)	Non-Diabetic Group (n=30)	p-value
Operative Time (mins)	75.2 ± 10.5	65.3 ± 9.8	<0.001
Gallbladder Wall Thickness (mm)	4.8 ± 0.6	3.6 ± 0.5	<0.001
Adhesions	18 (60%)	8 (27%)	0.012
Bile Spillage	12 (40%)	4 (13%)	0.005

Diabetic patients experienced more complications during surgery, as summarized in **Table 3**. Although not statistically important, bleeding was more frequent among diabetics (10% vs. 3.3%; p=0.287). Diabetics were more likely to convert to open surgery (13.3%) than non-diabetics (3.3%, p=0.053). Compared to 10% of individuals without diabetes, 23.3% of diabetic patients reported experiencing severe postoperative discomfort.

Table 3: Complications During Surgery

Complications	Diabetic Group (n=30)	Non-Diabetic Group (n=30)	p-value
Bleeding	3 (10%)	1 (3.3%)	0.287
Bile Duct Injury	1 (3.3%)	0 (0%)	0.317
Postoperative Pain (Severe)	7 (23.3%)	3 (10%)	0.142
Conversion to Open Surgery	4 (13.3%)	1 (3.3%)	0.053

According to postoperative results, individuals with diabetes needed lengthier hospital stays (3.8 ± 1.2 days) than patients without the disease (2.5 ± 0.8 days, p<0.001). Although this difference was not statistically significant (p=0.216), wound infections were more common in diabetics (16.7%) than in non-diabetics (6.7%). Additional analgesics were required by more diabetics (30% vs. 13.3%, p=0.095). Diabetics had significantly lower patient satisfaction levels (7.2 ± 1.5 vs. 8.4 ± 1.2, p=0.021). These results are shown in **Table 4.**

Table 4: Postoperative Outcomes

Parameter	Diabetic Group (n=30)	Non-Diabetic Group (n=30)	p-value
Hospital Stay (days)	3.8 ± 1.2	2.5 ± 0.8	<0.001
Wound Infection	5 (16.7%)	2 (6.7%)	0.216
Need for Additional Analgesics	9 (30%)	4 (13.3%)	0.095
Patient Satisfaction (1-10 scale)	7.2 ± 1.5	8.4 ± 1.2	0.021

Key points

Intraoperative Challenges: Diabetic patients showed increased operative difficulty, longer operative times, thicker gallbladder walls, more adhesions, and higher bile spillage rates.

Complications: Higher complication rates, including bleeding and conversions to open surgery, were observed in diabetics.

Postoperative Outcomes: Diabetic patients had prolonged hospital stays, more frequent infections, higher analgesic requirements, and lower satisfaction scores compared to non-diabetics.

Discussion

Diabetic patients faced greater intraoperative challenges compared to non-diabetics. They required significantly longer operative times (75.2 ± 10.5 minutes vs. 65.3 ± 9.8 minutes, p<0.001), reflecting the increased complexity of dissection. The gallbladder wall was thicker in diabetics (4.8 ± 0.6 mm vs. 3.6 ± 0.5 mm, p<0.001), likely due to chronic inflammation and fibrosis associated with diabetes. Furthermore, adhesions were significantly more common in diabetics (60% vs. 27%, p=0.012), complicating surgical access. Bile spillage, a risk factor for postoperative complications, was also more frequent in diabetics (40% vs. 13%, p=0.005). These findings suggest that diabetes exacerbates intraoperative difficulties, potentially increasing the risk of surgical complications.

Although not all complications reached statistical significance, diabetics demonstrated a higher trend of adverse events. Conversion to open surgery occurred more frequently in diabetics (13.3% vs. 3.3%, p=0.053), indicating greater difficulty in completing the procedure laparoscopically. Bleeding and bile duct injuries were rare but slightly more common in diabetics. Severe postoperative pain was reported by 23.3% of diabetics compared to 10% of non-diabetics, reflecting heightened inflammatory responses or surgical trauma. These findings highlight the significance of careful preoperative evaluation and attentive intraoperative care in patients with diabetes.

Diabetics showed noticeably longer postoperative recovery times. The length of hospital admissions was considerably longer (3.8 ± 1.2 days vs. 2.5 ± 0.8 days, p<0.001), most likely because of slower recovery and increased rates of wound infections. Despite the higher prevalence of wound infections in diabetics (16.7% vs. 6.7%), this difference was not statistically significant (p=0.216), possibly because of the small sample size. Diabetics required more frequent additional analgesics (30% vs. 13.3%, p=0.095), indicating higher postoperative pain levels. Patient satisfaction scores were significantly lower in diabetics (7.2 ± 1.5 vs. 8.4 ± 1.2, p=0.021), possibly due to prolonged recovery and higher pain levels. These findings highlight the need for targeted postoperative care and pain management for diabetic patients.

One important contributing factor has been found as DM influencing intraoperative findings and outcomes during laparoscopic cholecystectomy (LC). A study by Luthra et al. (2022) revealed that diabetic patients undergoing elective LC exhibited more adverse intraoperative findings compared to their non-diabetic counterparts. These findings, which frequently resulted in surgical challenges and a greater need for open conversion, included adhesions to surrounding structures, pericholecystic collections, and a gallbladder with thick walls. For diabetic and non-diabetic individuals to have similar results, the authors stressed the significance of thorough preoperative preparation [7].

Rahman and Agarwal (2021) conducted a prospective study to assess intraoperative difficulties in diabetic patients undergoing LC. Although intra-abdominal adhesions were more frequently observed in diabetics (46.7% vs. 34.7%), other complications such as intraoperative bleeding and dense adhesions showed no statistically significant differences between diabetic and non-diabetic patients. This led the authors to conclude that diabetes, as an independent factor, may not significantly contribute to difficult LC [8].

A cross-sectional study by Mahapure and Metgud (2019) highlighted the operative challenges posed by diabetes. Diabetic patients were more likely to experience complications such as challenging dissection in Calot's triangle, increased intraoperative bleeding, and prolonged surgical time compared to non-diabetic patients. These results highlight the necessity of cautious intraoperative treatment for individuals with diabetes [9]. The effects of LC in diabetic patients with acute cholecystitis were investigated by Serban et al. in 2021. According to their findings, diabetes patients were more likely to experience serious complications like cardiovascular events as well as small ones like surgery site infections. This emphasizes the necessity of rigorous glycemic control and careful perioperative care in order to reduce hazards [10].

Finally, Arora and Kumar (2021) found that while the presence of diabetes did not significantly increase immediate postoperative complications, patients with prior episodes of acute cholecystitis were more likely to develop intraoperative adhesions, prolonging surgery and elevating the risk of postoperative complications. The significance of a comprehensive preoperative evaluation and a complete surgical history is emphasized by this study [11].

Conclusion

The study's findings show that, in comparison to people without diabetes, diabetic patients experience noticeably more difficulties both during and after laparoscopic cholecystectomy. The existence of chronic inflammation, tissue fibrosis, and delayed healing associated with diabetes contributes to these outcomes. These findings call for tailored surgical approaches, meticulous intraoperative techniques, and enhanced perioperative management for diabetic patients. Preoperative optimization of glycemic control and careful monitoring of potential complications are essential to improve surgical outcomes in this high-risk group.

References

1. Kim JY, Kim JW, Ha GW. The efficacy of laparoscopic cholecystectomy in symptomatic gallstone disease: A meta-analysis. *Surg Endosc*. 2019;33(6):2013-2021.
2. Ghosh S, Pal R, Bhattacharya K. Gallstone disease in diabetics: A review. *Diabetes Metab Syndr*. 2020;14(2):110-115.
3. Zhang Q, Zhu S, Li P, et al. Diabetes mellitus and postoperative complications in patients undergoing laparoscopic cholecystectomy: A meta-analysis. *Int J Surg*. 2019; 67:15-22.
4. Luthra R, Sharma S, Mehta S. Comparative intraoperative findings in diabetics versus non-diabetics undergoing laparoscopic cholecystectomy. *Cureus*. 2020;12(9):e10421.
5. Sharma A, Gupta P, Yadav N. Outcomes of laparoscopic cholecystectomy in diabetics: A prospective study. *Indian J Surg*. 2021;83(4):114-119.
6. Singh V, Gupta A, Jain M. Laparoscopic cholecystectomy in diabetics: Impact of glycemic control on outcomes. *J Gastrointest Surg*. 2022;26(2):340-346.
7. Luthra A, Behura A, Behera C, Mishra A, Mohanty S, Panda B. Intraoperative findings of elective laparoscopic cholecystectomy in diabetics versus nondiabetics: a comparative study. Cureus. 2022;14: e20886.
8. Rahman ZA, Agarwal H. A prospective study of intraoperative difficulties during

laparoscopic cholecystectomy in diabetic patients. International Journal of Scientific Research. 2021;9(9):56-61.
9. Mahapure K, Metgud S. Effect of diabetes mellitus on operative outcome following laparoscopic cholecystectomy: a one-year cross-sectional study at a tertiary care hospital. Archives of International Surgery. 2019;9(2):78-83.
10. Serban D, Balasescu S, Aliuș C, Bălălău C, Sabău A, Badiu C, et al. Clinical and therapeutic features of acute cholecystitis in diabetic patients. Experimental and Therapeutic Medicine. 2021;22(1):758-62.
11. Arora J, Kumar D. Assessment of immediate postoperative complications in patients undergoing elective laparoscopic cholecystectomy for symptomatic cholelithiasis with pre-existing co-morbid conditions. International Surgery Journal. 2021;8(7):2251-7.