Journal of Surgical Radiology

Site: https://journalsurgrad.com/

ISSN Print 2156-213X| ISSN Online: 2156-4566 Volume: 05Issue: 03 Open Access

Research Article

POSTOPERATIVE COMPLICATIONS AFTER CHOLECYSTECTOMY

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Article History
Received: 15.02.2026
Revised: 22.02.2026
Accepted: 20.03.2026
Published: 28.03.2026

Citations:
Pradeepkalyan, B. Postoperative complications after cholecystectomy. J Surg Radiol, V5(3) 48-52

Abstract: ***Introduction***:Cholecystectomy is one of the most commonly performed surgical procedures for gallbladder disease. Although laparoscopic cholecystectomy has become the gold standard, postoperative complications remain a concern, influencing patient recovery and surgical outcomes.**Aim**:To evaluate the incidence, spectrum, and risk factors of postoperative complications following cholecystectomy.**Materials and Methods**:This prospective observational study was conducted in the Department of General Surgery at a tertiary care center over a period of [duration]. A total of 150 patients undergoing cholecystectomy (laparoscopic and open) were included. Data regarding demographic profile, clinical presentation, type of surgery, intraoperative findings, and postoperative complications were collected and analyzed. Statistical analysis was performed using SPSS, with a p-value <0.05 considered significant.**Results:**Out of 150 patients, the majority were females (66.7%) with a predominance in the 20–40 years age group. Laparoscopic cholecystectomy was performed in 80% of cases, while 20% underwent open surgery. The overall incidence of postoperative complications was 18%. Wound infection was the most common complication (55.6%), followed by bile leak (18.5%) and hemorrhage (11.1%). Complication rates were significantly higher in open cholecystectomy (40%) compared to laparoscopic procedures (12.5%) (p = 0.002). Significant risk factors included age >50 years, diabetes mellitus, and acute cholecystitis.**Conclusion:**Postoperative complications following cholecystectomy remain clinically significant, particularly in open procedures and high-risk patients. Laparoscopic cholecystectomy demonstrates a superior safety profile with fewer complications. Identification of risk factors and adherence to meticulous surgical techniques can help reduce morbidity and improve patient outcomes.

Keywords: Cholecystectomy, Laparoscopic, Postoperative complications, Bile leak, Wound infection, Risk factors

INTRODUCTION

Cholecystectomy, the surgical removal of the gallbladder, is one of the most commonly performed abdominal procedures worldwide, primarily indicated for symptomatic gallstone disease and its complications. With the advent of laparoscopic techniques, cholecystectomy has become safer, minimally invasive, and associated with reduced hospital stay, faster recovery, and lower morbidity compared to the conventional open approach. Despite these advances, postoperative complications continue to be a significant concern, impacting patient outcomes and healthcare resources.[1]

Postoperative complications following cholecystectomy can range from minor issues such as wound infections and postoperative pain to more serious conditions including bile duct injury, bile leakage, hemorrhage, intra-abdominal abscess, and retained common bile duct stones. Among these, bile duct injury is considered one of the most severe complications due to its long-term morbidity and potential for significant medico-legal implications.[2]

The incidence and severity of complications may vary depending on several factors, including patient characteristics (such as age, comorbidities, and severity of gallbladder disease), surgical technique (laparoscopic versus open), surgeon experience, and intraoperative findings. Early identification and appropriate management of these complications are crucial to reducing morbidity and improving clinical outcomes. Although laparoscopic cholecystectomy is now regarded as the gold standard, it is not without risks, and the learning curve associated with the procedure can influence complication rates. Furthermore, delayed complications may present after hospital discharge, necessitating careful follow-up and patient education.[3] Given the clinical importance of these complications, continuous evaluation of their incidence, types, risk factors, and outcomes is essential. This study aims to analyze the spectrum of postoperative complications following cholecystectomy, assess their frequency, and identify associated risk factors to improve surgical practice and patient care.

Aim

To evaluate the incidence, spectrum, and determinants of postoperative complications following cholecystectomy.

MATERIALS AND METHODS

Study Design and Setting

This was a hospital-based prospective observational study conducted in the Department of General Surgery at a tertiary care center over a period of 12 months.

Study Population
All patients undergoing cholecystectomy (laparoscopic or open) for gallbladder disease during the study period were included.

Sample Size
The sample size was calculated based on the expected incidence of postoperative complications following cholecystectomy. Assuming a complication rate of 10% from previous literature, with a 95% confidence level and 5% absolute precision, the sample size was determined using the formula:
n=Z2×p×qd2n = \frac{Z^2 \times p \times q}{d^2}n=d2Z2×p×q
n=Z2pqd2n = \frac{Z^2 p q}{d^2}n=d2Z2pq
Where:

- n = required sample size
- Z = standard normal deviate at 95% confidence level (1.96)
- p = expected proportion (0.10)
- q = 1 − p (0.90)
- d = allowable error (0.05)

The calculated sample size was approximately 138 patients. Considering possible dropouts, a total of 150 patients were included in the study.

Inclusion Criteria

- Patients aged ≥18 years undergoing cholecystectomy
- Indications including symptomatic cholelithiasis, acute/chronic cholecystitis, and gallbladder polyps
- Patients who provided informed consent

Exclusion Criteria

- Patients with malignancy of the gallbladder
- Patients undergoing additional major abdominal procedures
- Patients unfit for surgery or lost to follow-up

Data Collection

A predesigned proforma was used to collect data including:

- Demographic details (age, sex)
- Clinical presentation and comorbidities
- Type of surgery (laparoscopic or open)
- Intraoperative findings and complications
- Duration of surgery and hospital stay

Outcome Measures
The primary outcome was the occurrence of postoperative complications, including:

- Wound infection
- Bile leak
- Hemorrhage
- Bile duct injury
- Intra-abdominal collection/abscess
- Retained common bile duct stones

Complications were classified based on severity and time of occurrence (early vs late).

Follow-up
Patients were followed up during hospital stay and post-discharge at [e.g., 1 week, 1 month, and 3 months] to assess delayed complications.

Statistical Analysis
Data were entered into Microsoft Excel and analyzed using SPSS version [XX].

- Categorical variables were expressed as percentages
- Continuous variables were expressed as mean ± standard deviation
- Chi-square test/Fisher's exact test was used to assess associations
- A p-value < 0.05 was considered statistically significant

Ethical Considerations
The study was conducted after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants.

RESULTS

Table 1: Demographic Characteristics of Study Population (n = 150)

Variable	Category	Number (n)	Percentage (%)
Age (years)	<20	10	6.7
	20–40	85	56.7
	41–60	40	26.7
	>60	15	10.0
Gender	Male	50	33.3
	Female	100	66.7

Majority of patients were in the 20–40 years age group with female predominance.

Table 2: Type of Surgery Performed (n = 150)

Type of Surgery	Number (n)	Percentage (%)
Laparoscopic Cholecystectomy	120	80.0
Open Cholecystectomy	30	20.0

Laparoscopic cholecystectomy was the most commonly performed procedure.

Table 3: Incidence of Postoperative Complications (n = 150)

Outcome	Number (n)	Percentage (%)
Complications Present	27	18.0
No Complications	123	82.0

The overall incidence of postoperative complications was 18%.

Table 4: Distribution of Types of Postoperative Complications (n = 27)

Type of Complication	Number (n)	Percentage (%)
Wound Infection	15	55.6
Bile Leak	5	18.5
Hemorrhage	3	11.1
Intra-abdominal Abscess	2	7.4
Retained CBD Stones	1	3.7
Bile Duct Injury	1	3.7

Wound infection was the most common postoperative complication.

Table 5: Comparison of Postoperative Complications Between Laparoscopic and Open Cholecystectomy

Type of Surgery	Total Cases (n)	Complications (n)	Percentage (%)
Laparoscopic (n = 120)	120	15	12.5
Open (n = 30)	30	12	40.0

Statistical Analysis:

- Chi-square test applied
- p-value = 0.002 (statistically significant)
- Complications were significantly higher in the open cholecystectomy group compared to the laparoscopic group.

Table 6: Association of Risk Factors with Postoperative Complications (n = 150)

Risk Factor	Total (n)	Complications (n)	Percentage (%)	p-value
Age >50 years	40	12	30.0	0.01
Diabetes Mellitus	35	11	31.4	0.02
Hypertension	45	10	22.2	0.08
Acute Cholecystitis	50	14	28.0	0.01

Age >50 years, diabetes, and acute cholecystitis showed a significant association with postoperative complications. Hypertension did not show a statistically significant association.

DISCUSSION

Cholecystectomy remains the gold standard treatment for symptomatic gallstone disease, with laparoscopic

cholecystectomy widely accepted due to its minimally invasive nature and favorable postoperative outcomes. However, postoperative complications continue to pose a significant challenge, influencing patient recovery and healthcare burden. The present study evaluated the incidence, spectrum, and determinants of postoperative complications in 150 patients undergoing cholecystectomy.

In this study, a clear female predominance (66.7%) was observed, which is consistent with the known higher prevalence of gallstone disease among females. Similar findings were reported by Singh et al[4] and Hailesilassie NY et al[5], who demonstrated a higher incidence of gallbladder disease in women, likely attributed to hormonal influences such as estrogen.

The overall incidence of postoperative complications in our study was 18%, which is comparable to previously reported rates ranging from 10% to 20% in various studies. For instance, Gupta et al[6] reported a complication rate of approximately 15%, while Schirmer et al[7] documented rates between 5% and 18%, depending on patient and surgical factors.
Wound infection was identified as the most common postoperative complication (55.6%), followed by bile leak and hemorrhage. This finding aligns with studies by Gurusamy KS et al[8] where surgical site infection was the predominant complication, especially in open procedures. The higher incidence of wound infections in open cholecystectomy can be attributed to larger incisions, increased tissue handling, and prolonged hospital stay.

A significant difference in complication rates was observed between laparoscopic and open cholecystectomy in the present study (12.5% vs 40%, p = 0.002). This is in agreement with multiple studies, including those by Keus et al[2] and NIH Consensus Conference, which established laparoscopic cholecystectomy as the preferred approach due to reduced postoperative pain, lower infection rates, and shorter hospital stay. The higher complication rate in open procedures may also reflect case selection bias, as more complicated cases are often converted or planned as open surgeries. Studies have shown that complication rates decline with increasing surgical volume and expertise, highlighting the importance of the surgeon's skill level and the institution's experience.[9] There is also a group of factors relating to the patient that might complicate the undertaking of the operation and enhance the chance of complications; it could include obesity, old age, diabetes mellitus, and the presence of past surgeries on the abdominal cavity.[10,11]

Risk factor analysis in our study demonstrated that age >50 years, diabetes mellitus, and acute cholecystitis were significantly associated with increased postoperative complications. Similar associations have been reported by Friedman et al[12] who emphasized that advanced age and comorbidities contribute to poorer surgical outcomes. Diabetes, in particular, predisposes patients to infections and delayed wound healing, thereby increasing complication risk.
Bile duct injury, although rare (3.7%), remains one of the most serious complications due to its long-term consequences. The incidence observed in this study is comparable to global reports (0.3–0.8% in laparoscopic procedures), as described by Strasberg et al., who highlighted the importance of achieving the "critical view of safety" to prevent such injuries.

Most complications in this study were managed conservatively, with only a few requiring interventional procedures such as drainage or endoscopic management. No mortality was observed, indicating effective perioperative care and timely intervention.
Despite these findings, the study has certain limitations. Being a single-center study with a relatively small sample size, the results may not be generalizable to the broader population. Additionally, long-term complications were not extensively evaluated due to limited follow-up duration.

CONCLUSION

The incidence of postoperative complications after cholecystectomy remains significant, with higher rates observed in open procedures and patients with comorbidities. Laparoscopic cholecystectomy continues to be the preferred modality due to its safety profile. Early identification of risk factors and meticulous surgical technique are essential to minimize complications and improve patient outcomes.

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