

A Study To Assess Clinical Presentation, Investigations, Peroperative Findings And Post Operative Outcome For Laparoscopic Cholecystectomy At Tertiary Care Hospital

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Abstract

Background: Laparoscopic cholecystectomy has become the gold standard for symptomatic gallbladder disease, yet perioperative profiles and early outcomes vary across centres, especially in high-volume government teaching hospitals. This study was undertaken to evaluate clinical presentation, preoperative work-up, intraoperative findings and early postoperative outcomes of patients undergoing laparoscopic cholecystectomy at a tertiary care hospital.

Material and Methods: This observational study included 300 consecutive patients aged 18–75 years with symptomatic gallbladder disease undergoing elective laparoscopic cholecystectomy over two years at a tertiary care government hospital. Detailed history, examination, ultrasonography and baseline laboratory investigations were recorded. Intraoperative details, operative time, complications, need for drain placement and conversion were noted, and patients were followed for 30 days to document postoperative complications and Clavien–Dindo grades. Data were analysed using descriptive statistics and appropriate tests of significance with $p < 0.05$ considered statistically significant.

Results: Most patients were middle-aged females, with a mean age of 44.2 years and mean BMI in the overweight range; gallstones were the predominant diagnosis. Recurrent biliary colic was the commonest presenting symptom. The majority of surgeries were completed within 60–120 minutes, and 82.3% had no intraoperative complications; stone spillage, bile leak and trocar-site bleeding were infrequent events. Drains were placed in 28.3% of cases, postoperative wound infection, bile leak, ICU admission, transfusion and conversion to open surgery were rare, and 99% of patients experienced only Grade I complications.

Conclusion: Laparoscopic cholecystectomy in this tertiary care setting was associated with favourable perioperative profiles, low complication rates and excellent early recovery, underscoring its safety and effectiveness when performed with meticulous technique and appropriate patient selection.

Keywords: Laparoscopic cholecystectomy; Gallstones; Perioperative outcomes; Postoperative complications; Clavien–Dindo classification.

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I. Introduction:

Diseases of gallbladders, especially cholelithiasis (gallstones), is a major cause of abdominal pain and gastrointestinal disturbances worldwide, affecting both developed and developing nations. This can be attributed to the shift in lifestyle factors such as urbanization, sedentary habits, increasing rates of obesity and changes in diet. These factors have contributed significantly in a steady rise towards global prevalence of gall stones. Epidemiological estimates reveal that gallstones are encountered more often with advancing age and certain populations are at higher risk compared to others.¹

Since decades, open cholecystectomy was the definitive surgical intervention for gallbladder pathology, which involves a large abdominal incision to remove the gallbladder. However, the surgical landscape has witnessed a dramatic evolution since the introduction of laparoscopic cholecystectomy (LC) in the early 1990s.² This technique is minimally invasive which has entirely transformed the management of gallbladder diseases and has become the gold standard for surgical interventions due to its superior clinical outcomes and widespread patient acceptance.

The shift from open to laparoscopic approaches marked a paradigm shift in surgical practice, offering numerous distinct advantages. This procedure is associated with significantly reduced postoperative pain, smaller incisions, lower surgical site infections, shorter hospital stays, faster recoveries and better cosmetic results. These attributes have helped in increasing the quality of patient care and have reduced the broader burden on healthcare systems through shorter inpatient durations with far less number of complications postoperatively. Despite these

benefits, it is important to recognize that LC is not devoid of risks. In certain conditions such as emergency surgeries, abnormal anatomy, severe inflammation, the procedure can become technically demanding and may be associated with an increased risk of biliary or vascular injury.³

Epidemiological data consistently demonstrate a higher prevalence of gallstones in females aged between 30 to 60 years. This gender predisposition can be attributed to hormonal influences estrogen promotes cholesterol secretion in bile, while progesterone inhibits gallbladder motility, both of which generates gallstone formation. Risk factors such as obesity, weight loss, diabetes mellitus and a positive family history further contribute to disease susceptibility.⁴

A diverse array of symptoms may be presented by gallbladder diseases which can confirm diagnosis and management. Biliary colic is the most common symptom which is reported, often described as severe right upper quadrant pain, which can radiate to the back or right shoulder and can lead to ingestion of fatty meals. Other symptoms may include nausea, vomiting, flatulence, dyspepsia and abdominal bloating which complicated cases such as cholecystitis presenting with systemic features such as fever, jaundice and sepsis.⁵

A thorough preoperative evaluation is important to optimize surgical outcomes and patient safety. Abdominal ultrasonography (USG) is the frontline diagnostic tool, allowing for the assessment of gallstone characteristics, gallbladder wall thickness, pericholecystic fluid and detection of potential complications such as empyema or perforation.⁶ Liver function tests and complete blood count (CBC) further inform the presence of biliary obstruction, infection or liver dysfunction which can ensure an adequate preparation of surgery.⁷

Intraoperatively, achieving the “Critical View of Safety” (CVS) is important to minimise risk during the procedure. While this technique safeguards against inadvertent injury to the common bile duct and vascular structures, surgeons may encounter significant challenges due to dense adhesions, anatomic anomalies or inflammation. Rare findings such as short cystic duct, low duct insertion, distended gallbladder or Mirizzi syndrome can create further complications.

Thus the present study was designed to evaluate the clinical presentation, diagnostic investigations, intraoperative findings, and postoperative outcomes of patients undergoing laparoscopic cholecystectomy at a tertiary care hospital. Furthermore, intraoperative challenges and postoperative outcomes, including operative time, complications, and duration of hospital stay will also be evaluated for better understanding of the procedure.

II. Materials And Methods:

Study Design: An Observational Study

Study Setting: PDU Government Civil Hospital, Rajkot

Study period: 2 years

Target population: All patients who attended surgical department in age group between 18-75 years at PDU medical college and hospital, Rajkot.

Sample size: 300 cases

Ethical clearance: Institute Ethics Clearance Committee was obtained before the start of study.

Consent: Written and informed consent of all the patients was taken prior to their enrolment in the study

Method:

Symptomatic patients of cholelithiasis and other GB pathologies were included in the study. All these patients were clinically examined and evaluated for surgery.

Inclusion Criteria:

All patients in age group 18-75 years coming to surgical OPD:

- History of abdominal pain with symptomatic GB disease requiring operative intervention.
- History of abdominal pain with USG showing GB pathology requiring operative intervention.
- GB stone, GB polyp

Exclusion Criteria:

Excluded in patient with –

- Coagulopathy
- Cholecystitis with complications (empyema, perforation)
- Emergency Surgery
- Portal Hypertension
- Patient managed conservatively
- Patient undergone open surgical procedure

Statistical Analysis:

All the collected data was recorded in Microsoft Excel and analyzed. Categorical variables have been described as frequencies and percentages. Discrete variables have been described in terms of median and interquartile range. Continuous variables were summarized as mean and standard deviation and finally the appropriate statistical tests were applied for data analysis. p value <0.05 was considered statistically significant.

III. Results

The demographic distribution revealed that majority of the patients belonged to the age group of 30 to 45 years and the study population was dominated by females. As the literature suggested, majority of the patients were overweight which might be a cause in gall stone formation. Patients experienced symptoms at varying time points. Some reported within a month or 3, while some took longer time duration to report (Table 1).

Table 1: Demographic distribution and duration of symptoms among patients

Parameter	Categories	Number of patients	Percentage
Age groups	18 to 30 years	68	22.67
	30 to 45 years	99	33
	45 to 60 years	81	27
	60 to 75 years	52	17.33
Gender	Male	119	39.67
	Female	181	60.33
BMI categories	Underweight	7	2.33
	Normal Weight	130	43.33
	Overweight	145	48.33
	Obesity	18	6
Duration of symptoms	None	25	8.34
	1 month	102	34
	3 months	111	37
	6 months	41	13.67
	1 year	21	7

The mean age of the patients was 44.22 ± 0.87 , indicating a moderately middle-aged cohort with minimal variation across the sample, while the average body mass index (BMI) was 25.32 ± 0.17 kg/m² (SEM 0.17) and the mean duration of symptoms was 83.01 ± 5.22 days (Fig. 1).

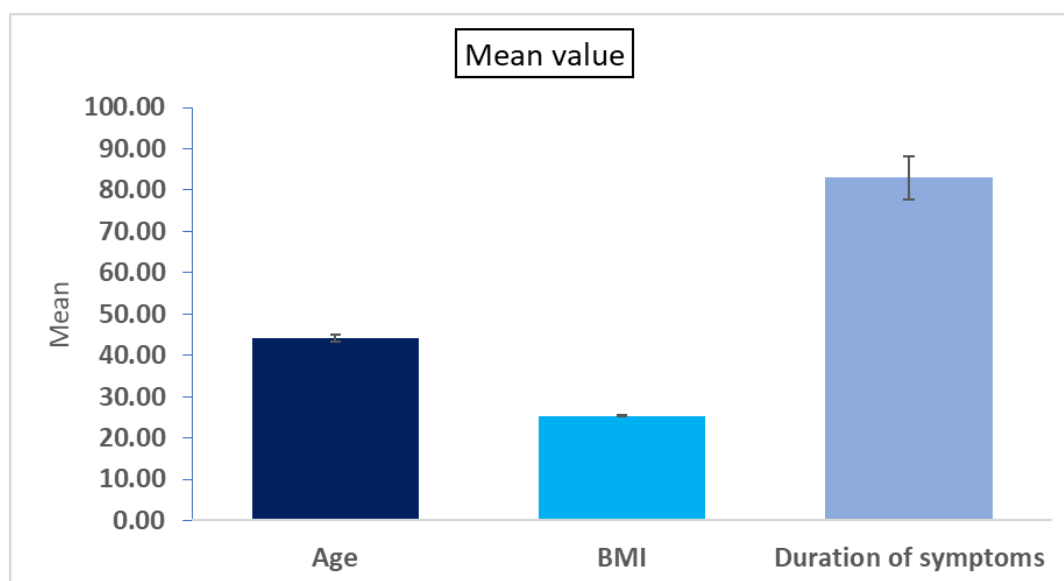


Fig. 1: Bar graphs representing Mean values of demographic and clinical parameters (n = 300, data is represented as mean \pm SEM)

A significant majority of the cohort, 271 patients (90.33%) reported recurrent episodes of biliary colic, indicating a chronic or relapsing nature of the condition in most individuals (Table 2). Table 3 represents the different diagnosis confirmed in patients with maximum number of patients diagnosed with gall stones. •

Regarding pallor, it was observed in an overwhelming majority of patients—299 out of 300 (99.67%)—with only one individual (0.33%) showing no pallor. This distribution yielded a Chi-square value of 296.01, with a p-value of <0.01, signifying a highly significant association. The near-universal presence of pallor in the sample may point toward a common underlying condition such as anemia, potentially related to chronic disease, nutritional deficiency, or systemic illness prevalent in this population.

Table 2: Occurrence of biliary colic episodes

Biliary colic episode	Number of patients	Percentage
First	4	1.33
Recurrent	271	90.33
None	25	8.33
Total	300	100

Table 3: Clinical diagnoses

Diagnosis	Number of patients	Percentage
Gall stones	270	90
Acute cholecystitis	26	8.67
GB polyp	1	0.33
Others	3	1
Total	300	100

The most common comorbidities reported were hypertension and diabetes presented in Table 4. Overall, while the actual prevalence of comorbidities was low, the statistical findings suggest that even these low or null distributions have clinical and analytical relevance, possibly indicating patient selection trends or disease-specific exclusions in the studied cohort. This table 5 summarizes the distribution of vital signs temperature, pulse, blood pressure, and respiratory rate among the 300 patients evaluated, categorized into standard clinical ranges. The laboratory findings support the clinical impression of a generally well-compensated population with preserved organ function at the time of evaluation (Table 6).

Table 4: Presence of comorbidities among the patients

COMORBIDITIES	Present
Hypertension	27/300
Diabetes Mellitus	29/300
Ischemic Heart Disease	2/300

Table 5: Pre op vitals

Vitals	Hypothermic	Normothermic	Hyperthermic	Total
Temperature	0	300	0	300
	<60bpm	60-100bpm	>100 bpm	
Pulse	0	300	0	300
	Hypotensive	Normotensive	Hypertension	
Blood Pressure	0	270	30	300
	Bradypnea	Normal	Tachypnea	
Respiratory Rate	0	300	0	300

Table 6: Haematological and biochemical parameters

Blood investigations	Mean
Hb	10.24 ± 0.08
TLC (10 ³)	6.87 ± 0.13
PC (10 ⁵)	2.71 ± 0.70
S. creatinine	0.70 ± 0.02
RBS (10 ²)	0.96 ± 0.13
Totsl billurubin	0.63 ± 0.01
Direct billurubin	0.30 ± 0.01

INR	0.99 ± 0.01
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The distribution of surgical durations among the study population highlights that the majority of procedures were performed within a moderate time frame (Table 7).

Table 7: Surgical durations among the study population

Duration of surgery	Number of surgeries	Percentage
≤60 minutes	50	16.67
60 to 120 minutes	200	66.67
120 to 180 minutes	42	14
180 to 240 minutes	8	2.67

In this study, antibiotic administration patterns revealed that none of the patients received only a single prophylactic dose. The result strongly suggests a prevailing clinical practice favoring extended antibiotic regimens in the studied population (Table 8).

Table 8: Antibiotic administration patterns

Antibiotics	Single dose	2-3 doses	>3 doses
Number of patients	0	40	260
Chi square value = 392, df = 2, p<0.01**			

The table 9 presents the distribution of intraoperative complications among 300 patients. The majority of patients (247, or 82.33%) experienced no complications, highlighting the overall safety of the surgical procedure. Overall, the incidence of major complications was low, and the high proportion of patients without any complications reinforces the procedural safety in this cohort.

Table 9: Intra operative complications

Intra operative complications	Number of patients	Percentage	Chi square value	p value
Stone Spillage	13	4.34	731.6	<0.01**
Trocar site bleeding	15	5		
Bile leak from GB	22	7.34		
Bleeding from Calots	3	1		
None	247	82.34		
Total	300	100		

In the present study, abdominal drains were required in 85 out of 300 patients, accounting for 28.33% of the cohort, intra-abdominal collection was observed in only 2 patients. Post operative wound infection rate, bile leak and ICU admission were very less. Only 3 patients required blood transfusion, while less than 2% patients required conversion to open procedure (Table 10).

Table 10: Post op complications observed in the patients

Post op complications	Yes	p value
Abdominal Drain	85	0.0001**
Intra-abdominal collection	2	<0.01**
Post operative wound infection	4	<0.01**
Post operative Bile leak	4	<0.01**
ICU admission	5	<0.01**
Blood transfusion	3	<0.01**
Conversion to open procedure	5	<0.01**
Readmission	1	<0.01**

The majority of patients (297 individuals, representing 99%) experienced Grade 1 complications, which are defined as any deviation from the normal postoperative course without the need for pharmacological treatment or surgical, endoscopic, or radiological interventions. To assess the statistical significance, a chi-square test was performed. The resulting chi-square value was 288.12, with a highly significant p-value of <0.01**. This p-value indicates a strong and statistically significant association, suggesting that the observed difference in the

distribution of Clavien-Dindo grades between the compared groups is highly unlikely to be due to random chance (Table 11).

Table 11: Clavien Dindo grade of complications

Clavien Dindo grade of complications	Number of patients	Percentage	Chi square value	p value
Grade 1	297	99	288.12	<0.01**
Grade 2	3	1		
Total	300	100		

IV. Discussion

The findings of this study revealed a clear predominance of middle aged females, between 30 to 60 years of age in the cohort, supporting earlier findings that recognize this age group as a critical window for the onset of gall bladder and biliary tract disease (Khan et al., 2023²⁷ Chandramouli, 2019²⁸ and Kumar & Sindhal 2024²⁹). Higher number of females in the present study aligns with the established epidemiological trends and is likely due to the effect of estrogen on bile composition and gall stone development, but the rising incidence in men point towards changing life style. The results also demonstrate the mean BMI as 25.32 kg/m², placing the majority of patient in overweight category which is associated with prevalence of gall stones mirroring the results published by Khan et al., 2023²⁷ with a mean BMI of 26.71 to 27.25 kg/m². Stendor et al., 2013³⁰ also reported that high BMIs are directly to development of gall stones. Stinton and Shaffer 2012³¹ also published similar reports.

It was observed that patients in the present study consulted actively for their symptoms. 71% patients consulted within three months of experiencing symptoms. This encourages timely diagnosis and management.

The clinical and demographic characteristics of our sample reflected by a modest mean age and BMI, together with a relatively consistent symptom duration suggest a homogeneous cohort, though variability was observed in symptom reporting, perhaps due to differences in healthcare access or symptom perception.

Majority of the patients were diagnosed with gallstones as recurrent and chronic pattern of biliary colic. Stinton and Shaffer 2012³¹, also reported similar findings.

Other biliary pathologies, such as gallbladder polyps, were rare. Pallor was seen in almost all patients, with an average hemoglobin of 10.24 ± 0.08 g/dL, a finding indicative of mild, predominantly normocytic anemia as seen in previous work (Al- Mulhim, 2018.³² Khali et al., 2013.³³). The hematological and biochemical profiles showed general stability across the cohort, with normal mean leukocyte and platelet counts as well as preserved renal and hepatic function.

Although comorbidities were infrequent, diabetes and hypertension were statistically significant, echoing patterns from Jarrar et al., 2024³⁴ and Khan et al., 2023²⁷. The average operative time ranged from 60–120 minutes for most cases, reflecting the complexity of the surgical intervention and the teaching hospital context, consistent with times reported by Jarrar et al., 2024³⁴ and Khan et al., 2023²⁷.

Antibiotic use was widespread, with 86.67% of patients receiving more than three doses. The significant Chi-square result indicates a strong preference for extended prophylaxis, reflecting infection control priorities but also raising concerns about antimicrobial stewardship. Abdominal drains were placed in 28.33% of patients, and their use was significantly associated with clinical or intraoperative factors, supporting selective rather than routine drainage.

The present study demonstrates a low overall complication rate, reflecting the safety and efficacy of the surgical approach adopted. Intraoperative complications were observed in a minority of patients, with 80.67% experiencing no adverse events. These findings are consistent with known intraoperative risks and emphasize the importance of meticulous surgical technique, especially in inflamed or thick-walled gallbladders.

Agarwal et al., 2020³⁷ reported that the most frequent intraoperative complication was trocar site bleeding and liver bed injury. The incidence of postoperative wound infection in this study cohort was remarkably low, with only 4 out of 300 patients (1.33%) affected. All the cases were having only superficial wound infection occurred in 4th -5th post operative day and with conservative Management were resolved within 2 week. This low infection rate is indicative of effective perioperative care, including adherence to sterile surgical techniques, appropriate use of prophylactic antibiotics, and stringent postoperative wound care protocols.

Taken together, these findings highlight a commendably low rate of both intraoperative and postoperative complications in the studied population. The statistically significant events namely stone spillage, bile leak, and readmission underscore the necessity of continuous quality assurance, careful technique, and vigilant postoperative follow-up. Future studies could aim to identify specific patient- or disease-related predictors for these complications to enable targeted risk stratification and individualized care.

- Bharai et al., 2024²⁹ also reported very few complications such as hemorrhage, port site infection and mortality to be 0.83% each. Adam et al., 2023³⁸ also published that there were only three major complications that included postoperative hemorrhage, pulmonary embolism, and one bile leak.

- Clavien-Dindo classification showed that 99% of complications were Grade 1, with only 1% experiencing Grade 2 events, indicating a generally smooth postoperative course.
- Khalid et al., 2023³⁹ reported similar results with Grade I and II complications were observed in both laparoscopic and open cholecystectomy groups, while Grade III complications occurred exclusively in the open surgery group.
- Among the 40 patients who underwent laparoscopic cholecystectomy, 35% developed low-grade complications, compared to 40% in the open cholecystectomy group, with respiratory issues being the most frequently reported complication.
- Yadav et al., 2024⁴⁰ reported 10% readmission rate with a significant p value (0.012*).
- In a study by Agarwal et al., 2020³⁷, bile duct injury was observed in 5 patients (2.5%) with a statistically significant p value of 0.045. Wound infections occurred in 12 patients (6%) and were also statistically significant ($p = 0.021$). In contrast, bleeding was noted in 8 patients (4%) but did not reach statistical significance ($p = 0.113$).
- The most common complication was trocar site bleeding (6.66%), with a 5.83% conversion rate to open cholecystectomy as published by Bharai and Sindhai, 2024.⁴¹
- In this study, various intraoperative complications were recorded with differing frequencies. Trocar site bleeding was the most common, occurring in 8 patients (6.66%), followed by liver bed injury in 7 patients (5.83%) and bile leakage from the gallbladder in 6 patients (5%). Bleeding from Calot's triangle was observed in 3 cases (2.50%), while spilled gallstones occurred in 2 patients (1.66%). Injury to the common bile duct and bowel injury were the least frequent, with each affecting 1 patient (0.83%). These findings highlight the spectrum of possible intraoperative complications during surgery, with most being relatively uncommon.

V. Conclusion

In the present study, laparoscopic cholecystectomy was evaluated with a focus on perioperative outcomes and early postoperative recovery, with patients followed for a duration of 30 days. However, this limited follow-up duration precludes the evaluation of long-term complications such as post-cholecystectomy syndrome, bile duct strictures, or incisional hernias, which may develop months to years after surgery.