

**Retrospective analysis of outcomes in laparoscopic vs open cholecystectomy in ICARE Institute of Medical Sciences Research, West Bengal****Ravi Ranjan****Associate Professor, Department of General Surgery, ICARE Institute of Medical Sciences and Research and Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India****Received: 09-04-2022 / Revised: 12-05-2022 / Accepted: 27-06-2022****Corresponding Author: Dr. Ravi Ranjan****Conflict of interest: Nil****Abstract**

**Background:** Gallstone disease is one of the most common gastrointestinal disorders requiring surgical intervention worldwide. Laparoscopic cholecystectomy has become the preferred treatment modality over open cholecystectomy because of its minimally invasive nature and improved postoperative recovery. However, postoperative complications and conversion to open surgery continue to remain important concerns in surgical practice.

**Aim:** The present study aimed to compare postoperative outcomes and complications between laparoscopic and open cholecystectomy in patients undergoing surgery for gallbladder disease.

**Methodology:** This retrospective comparative study was conducted in the Department of General Surgery, ICARE Institute of Medical Sciences and Research and Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India over a period of one year. A total of 130 patients undergoing laparoscopic or open cholecystectomy were included in the study. Data regarding demographic profile, operative details, postoperative complications, conversion rates, duration of hospital stay, and recovery outcomes were collected from hospital records and analyzed using IBM SPSS Statistics version 23.0.

**Results:** Laparoscopic cholecystectomy was associated with shorter operative duration, reduced blood loss, shorter hospital stay, and faster postoperative recovery compared with open cholecystectomy. Surgical site infection was the most common postoperative complication. Dense adhesions, acute cholecystitis, obesity, and increased gallbladder wall thickness were significant factors associated with conversion to open surgery.

**Conclusion:** Laparoscopic cholecystectomy demonstrated superior postoperative outcomes and lower morbidity compared with open cholecystectomy. Proper patient selection, surgical expertise, and early management of difficult cases may further reduce postoperative complications and improve surgical outcomes.

**Keywords:** Laparoscopic cholecystectomy; open cholecystectomy; postoperative complications; gallstone disease; surgical outcomes; retrospective study.

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**Introduction**

One of the most prevalent gastrointestinal conditions in the world, gallstone disease is a significant cause of morbidity that necessitates surgery. Abdominal discomfort, dyspepsia, nausea, vomiting, and, if untreated, consequences such as acute cholecystitis, empyema, pancreatitis, and obstructive jaundice are frequent symptoms of symptomatic cholelithiasis [1]. The only effective therapy for symptomatic gallstone disease is still cholecystectomy. Due to its less invasive nature, decreased postoperative discomfort, shorter hospital stay, quicker recovery, and better cosmetic results than open cholecystectomy, laparoscopic cholecystectomy has become the gold standard surgical method since its inception [2].

Despite the benefits of laparoscopic cholecystectomy, surgeons are nonetheless concerned about

intraoperative and postoperative complications. Depending on the severity of the illness, patient-related characteristics, and surgical skill, the reported incidence of complications after laparoscopic cholecystectomy varies from 0.5% to 6% [3]. While major complications like common bile duct injury and vascular injury are linked to significant morbidity and mortality and may necessitate conversion to open surgery, minor complications like wound infection, postoperative fever, bile leakage, and gallbladder perforation are typically treated conservatively [4]. With a frequency of 10% to 30%, gallbladder perforation with gallstone leakage is regarded as one of the most frequent intraoperative complications [5].

Difficult laparoscopic cholecystectomy and a higher risk of postoperative complications or conver-

sion to open surgery have been linked to a number of variables. Operative difficulty and postoperative morbidity have been found to be significantly predicted by male gender, advanced age, obesity, acute gallbladder inflammation, increased gallbladder wall thickness, elevated inflammatory markers, prior abdominal surgery, and gallbladder empyema [6]. Reducing intraoperative injuries and enhancing postoperative results need careful surgical technique, sufficient visualization of anatomical structures, and appropriate dissection during operation [7].

Open cholecystectomy still plays a significant role in instances needing conversion from laparoscopic operations, complex gallstone disease, problematic anatomy, and severe adhesions, even though laparoscopic cholecystectomy has several advantages over the open technique. In order to comprehend the safety, effectiveness, postoperative morbidity, length of hospital stay, and recovery associated with both surgeries, it is crucial to compare the postoperative results of laparoscopic and open cholecystectomy. When compared to open cholecystectomy, prior research has shown that laparoscopic cholecystectomy is linked to less postoperative discomfort, shorter hospital stays, fewer wound problems, and an earlier return to regular daily activities [8]. However, in certain complex circumstances when laparoscopic surgery is dangerous or logistically challenging, open cholecystectomy may still be the better option.

Postoperative complications occurring subsequent to cholecystectomy may result in a substantial increase in hospitalization, treatment expenses, patient morbidity, and postoperative recovery time. Surgeons may be able to enhance perioperative care and maximize surgical results by identifying characteristics linked to postoperative problems [9].

To compare postoperative results and complications between laparoscopic and open cholecystectomy at the ICARE Institute of Medical Sciences and Research in West Bengal, retrospective research was carried out.

### Methodology

**Study Design:** The present study was a hospital-based retrospective comparative observational study conducted to evaluate and compare postoperative outcomes and complications in patients undergoing laparoscopic and open cholecystectomy.

**Study Area:** The study was conducted in the Department of General Surgery, ICARE Institute of Medical Sciences and Research, and Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India

**Study Duration:** The study was carried out over a period of one year.

**Sample Size:** A total of 130 patients who underwent cholecystectomy during the study period were included in the study.

**Sample Population:** The study population included patients diagnosed with symptomatic cholelithiasis and related gallbladder diseases who underwent either laparoscopic cholecystectomy or open cholecystectomy at the study institution during the specified study period.

**Data Collection:** Data were collected retrospectively from hospital records, operative registers, discharge summaries, and electronic medical records. Information regarding demographic profile, clinical presentation, laboratory investigations, ultrasonographic findings, operative details, duration of surgery, intraoperative findings, postoperative complications, conversion to open surgery, duration of hospital stay, and postoperative recovery was recorded.

### Inclusion Criteria

- Patients aged more than 18 years.
- Patients diagnosed with symptomatic cholelithiasis.
- Patients undergoing laparoscopic cholecystectomy.
- Patients undergoing open cholecystectomy.
- Patients diagnosed with chronic cholecystitis.
- Patients diagnosed with acute cholecystitis.
- Patients with gallstone-related complications requiring surgery.
- Patients admitted and operated during the study period.
- Patients with complete hospital and operative records.

### Exclusion Criteria

- Patients diagnosed with gallbladder malignancy.
- Patients managed conservatively without surgery.
- Patients with incomplete medical or operative records.
- Patients with severe systemic illness unfit for surgery.
- Patients with previous major hepatobiliary surgery.
- Patients below 18 years of age.
- Pregnant women.
- Patients unwilling for surgical intervention.

**Procedure:** All patients underwent detailed preoperative evaluations including clinical examination, laboratory investigations, and abdominal ultrasonography. Additional imaging investigations were performed wherever indicated. Surgical procedures were carried out according to standard operative protocols for laparoscopic and open chole-

cystectomy. Intraoperative findings, operative duration, conversion to open surgery, blood loss, postoperative recovery, postoperative pain, complications, and duration of hospital stay were assessed from patient records. Postoperative complications such as bile duct injury, gallbladder perforation, surgical site infection, bile leakage, bleeding, and respiratory complications were evaluated and compared between the two groups.

**Statistical Analysis:** Statistical analysis was performed using IBM SPSS Statistics software version 23.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean  $\pm$  standard deviation, while categorical variables were presented as frequencies and percentages. The chi-square test and Fisher's exact test were used for comparison of

categorical variables, whereas independent Student's t-test was used for continuous variables. A p-value of less than 0.05 was considered statistically significant".

### Result

Table 1 displays the demographic and clinical characteristics of the patients who were enrolled in the study. 42.3% of patients were between the ages of 31 and 50, and 36.9% were between the ages of 51 and 70. Compared to male patients (43.1%), female patients (56.9%) were more frequently impacted. Open cholecystectomy was less common than laparoscopic cholecystectomy. The two most prevalent comorbidities were diabetes mellitus and hypertension. A significant percentage of patients did not have any concomitant conditions.

Variables	Laparoscopic Cholecystectomy (n=85)	Open Cholecystectomy (n=45)	Total (%)
<b>Age Group (Years)</b>			
18–30	12	4	16 (12.3%)
31–50	39	16	55 (42.3%)
51–70	28	20	48 (36.9%)
>70	6	5	11 (8.5%)
<b>Gender</b>			
Male	32	24	56 (43.1%)
Female	53	21	74 (56.9%)
<b>Comorbidities</b>			
Diabetes Mellitus	14	11	25 (19.2%)
Hypertension	18	15	33 (25.4%)
Obesity	12	8	20 (15.4%)
No Comorbidity	41	11	52 (40.0%)

Table 2 lists the research participants' cholecystectomy indications. The most frequent reason for surgery was symptomatic cholelithiasis (49.2% of patients), which was followed by acute cholecystitis (23.1%) and chronic cholecystitis (15.4%). Less

often seen symptoms included gallstone pancreatitis, mucocele gallbladder, and empyema gallbladder. For the majority of simple gallbladder conditions, laparoscopic cholecystectomy was recommended.

Indications	Laparoscopic (n=85)	Open (n=45)	Total (%)
Symptomatic Cholelithiasis	48	16	64 (49.2%)
Acute Cholecystitis	17	13	30 (23.1%)
Chronic Cholecystitis	12	8	20 (15.4%)
Empyema Gallbladder	3	5	8 (6.2%)
Mucocele Gallbladder	2	2	4 (3.1%)
Gallstone Pancreatitis	3	1	4 (3.1%)

Table 3 shows what happened during surgery and the specifics of the procedures for patients who had a laparoscopic or open cholecystectomy. Compared to the open surgery group, the laparoscopic group experienced a considerably shorter mean surgical time and intraoperative blood loss. Patients under-

going open cholecystectomy were more likely to have dense adhesions. Although it happened in all groups, gallbladder perforation was marginally more frequent with laparoscopic surgeries. In 8.2% of laparoscopic patients, conversion to open surgery was necessary.

Variables	Laparoscopic (n=85)	Open (n=45)	p-value
Mean Duration of Surgery (minutes)	74.6 ± 18.2	96.4 ± 24.7	<0.001
Mean Blood Loss (mL)	78.5 ± 24.1	146.8 ± 42.5	<0.001
Dense Adhesions	18 (21.2%)	19 (42.2%)	0.012
Gallbladder Perforation	11 (12.9%)	4 (8.9%)	0.487
Conversion to Open Surgery	7 (8.2%)	—	—

Table 4 illustrates the postoperative complications that were observed in the study participants. The most frequent postoperative consequence was surgical site infection, which was followed by respiratory issues and postoperative fever. Fewer individ-

uals had bile leakage, bleeding, or damage to their bile ducts. Patients undergoing open cholecystectomy experienced considerably greater postoperative problems. Most patients (66.9%) experienced no problems following surgery.

Complications	Laparoscopic (n=85)	Open (n=45)	Total (%)
Surgical Site Infection	5	9	14 (10.8%)
Bile Leakage	2	3	5 (3.8%)
Postoperative Fever	6	5	11 (8.5%)
Respiratory Complications	3	5	8 (6.2%)
Hemorrhage	1	2	3 (2.3%)
Bile Duct Injury	1	1	2 (1.5%)
No Complications	67	20	87 (66.9%)

Table 5 illustrates the distribution of postoperative complications in accordance with the Clavien–Dindo classification system. The most common type of problems were Grade II, then Grade I.

Grade III, Grade IV, and Grade V severe problems were less frequently experienced. Overall surgical results were good, since the majority of patients did not have considerable postoperative morbidity.

Clavien–Dindo Grade	Number of Patients	Percentage
Grade I	14	10.80%
Grade II	16	12.30%
Grade III	7	5.40%
Grade IV	3	2.30%
Grade V	1	0.80%
No Complications	89	68.40%

Table 6 contrasts the postoperative recovery parameters of the laparoscopic and open cholecystectomy groups. Compared to patients receiving open cholecystectomy, those undergoing laparoscopic cholecystectomy experienced a much shorter hospi-

tal stay, an earlier start to oral feeding, a shorter drain placement period, and a quicker return to their regular daily activities. These results suggest that the laparoscopic method improves postoperative recovery and lowers morbidity.

Variables	Laparoscopic (n=85)	Open (n=45)	p-value
Mean Hospital Stay (days)	3.8 ± 1.4	7.2 ± 2.3	<0.001
Time to Oral Feeding (hours)	18.5 ± 6.4	32.6 ± 8.7	<0.001
Mean Duration of Drain Placement (days)	1.2 ± 0.6	3.1 ± 1.1	<0.001
Return to Normal Activity (days)	8.6 ± 2.5	15.4 ± 4.2	<0.001

Table 7 shows the things that affect the change from a laparoscopic to an open cholecystectomy. The most frequent causes of conversion were thickened gallbladder walls and dense adhesions, which were followed by male gender and acute

cholecystitis. Obesity and gallbladder empyema were also shown to be contributory factors. These results imply that the risk of conversion to open surgery is greatly increased by acute inflammation and challenging operational anatomy.

**Table 7: Factors Associated with Conversion to Open Surgery**

Risk Factors	Conversion Cases (n=7)	Percentage
Acute Cholecystitis	3	42.90%
Dense Adhesions	5	71.40%
Empyema Gallbladder	2	28.60%
Obesity	2	28.60%
Male Gender	4	57.10%
Gallbladder Wall Thickness >4 mm	5	71.40%

### Discussion

Laparoscopic cholecystectomy showed superior postoperative results and fewer complications than open cholecystectomy in the current retrospective comparison research carried out at the ICARE Institute of Medical Sciences and Research, West Bengal. Laparoscopic cholecystectomy was more common than open surgery among the 130 patients in the research, indicating the growing preference for minimally invasive methods in the treatment of gallbladder illness. The bulk of patients were between the ages of 31 and 50, and both surgery groups had a female preponderance. Ibrahim et al. [10] found similar results, indicating that middle-aged female patients having laparoscopic cholecystectomy had a greater rate of symptomatic cholelithiasis. Hormonal variables, obesity, and metabolic issues linked to gallstone development may be responsible for the increased frequency in females”.

The current study showed that the most frequent reason for surgery was symptomatic cholelithiasis, which was followed by acute and chronic cholecystitis. Similar results were seen by Kama et al. [11], who found that over half of patients having cholecystectomy had symptomatic gallstone disease as their primary cause. In our study, open surgical procedures were more frequently linked to acute inflammatory diseases such empyema gallbladder and acute cholecystitis because of their deformed architecture and greater operating complexity. Fried et al. [12] observed similar findings, stating that patients with acute inflammatory gallbladder disease had greater conversion rates and more difficult surgeries.

The current study's intraoperative results showed that laparoscopic cholecystectomy resulted in much less blood loss and a shorter mean operating time than open cholecystectomy. The laparoscopic group's mean operating time was  $74.6 \pm 18.2$  minutes, whereas the open group's was  $96.4 \pm 24.7$  minutes. Similarly, laparoscopic operations resulted in significantly less blood loss. These results are in line with a research by Ros et al. [13] that showed patients having laparoscopic cholecystectomy had better postoperative recovery, shorter operating times, and less blood loss. Additionally, compared to traditional open surgery, minimally invasive surgery was linked to less tissue damage and im-

proved perioperative results, according to McMahon et al. [14].

In the current study, 8.2% of patients showed a conversion from laparoscopic to open surgery. Obesity, male gender, acute cholecystitis, gallbladder wall thickness, and dense adhesions were found to be significant predictors of conversion. According to Livingston and Rege [15], obesity, thick adhesions, and severe inflammation all considerably raise the likelihood of conversion after laparoscopic cholecystectomy. Ibrahim et al. [16] also showed that male gender and thicker gallbladder walls were independent risk variables linked to technically challenging laparoscopic operations and conversion to open surgery.

After a cholecystectomy, postoperative complications continue to be a significant factor in determining surgical results. The most frequent postoperative complication in this research was surgical site infection, which was followed by postoperative fever, respiratory issues, bile leakage, and bleeding. Patients receiving open cholecystectomy experienced higher complications than those undergoing laparoscopic surgery. Similar results were found in large multicenter research by Deziel et al. [17], who found that open operations were linked to higher postoperative morbidity and wound-related problems. Smaller incisions, less tissue handling, and a shorter postoperative immobilization period might all contribute to the decreased complication rate seen with laparoscopic surgery.

The Clavien-Dindo classification system was also used in this study to assess postoperative complications. While severe problems were comparatively rare, the majority of issues fell into the Grade I and Grade II categories. Schäfer et al. [18] reported similar outcomes, noting that most postoperative problems after laparoscopic cholecystectomy were small and conservatively treatable. Despite being uncommon, serious complications such bile duct damage and severe bleeding continued to be clinically relevant because of the morbidity and mortality they were linked to.

Patients who had laparoscopic cholecystectomy recovered far better after surgery. Compared to the open surgery group, the laparoscopic group's mean hospital stay was much shorter, and patients resumed their regular daily activities sooner. Keus et al. [19] found similar results and came to the con-

clusion that, in comparison to open cholecystectomy, laparoscopic cholecystectomy offers quicker postoperative recovery, earlier mobilisation, and lower hospitalization. Increased patient satisfaction after minimally invasive surgery is also influenced by less postoperative discomfort and better cosmetic results.

Open surgery is still crucial in cases of complex gallbladder illness and challenging surgical circumstances, even with the benefits of laparoscopic cholecystectomy. In the current study, individuals with extensive adhesions, empyema gallbladder, and significant inflammation were more likely to undergo an open cholecystectomy. In a similar vein, Peters et al. [20] stressed that in cases when laparoscopic dissection becomes technically risky or when significant intraoperative difficulties arise, open cholecystectomy is still a safe and successful surgery.

Overall, the results of this study show that, in comparison to open cholecystectomy, laparoscopic cholecystectomy is linked to fewer postoperative problems, shorter hospital stays, less intraoperative blood loss, and quicker postoperative recovery. However, reducing morbidity and enhancing surgical results in patients having cholecystectomy still depend on careful patient selection, suitable surgical competence, and prompt conversion to open surgery when necessary.

### Conclusion

In summary, the current retrospective comparative analysis showed that, in comparison to open cholecystectomy, laparoscopic cholecystectomy is linked to improved postoperative outcomes and decreased incidence of complications. Patients who underwent laparoscopic surgery had shorter hospital stays, less intraoperative blood loss, earlier oral feeding initiation, a quicker return to regular daily activities, and decreased postoperative morbidity. The most frequent postoperative consequence was found to be surgical site infection, although serious problems such bile duct damage and bleeding were very rare. Difficult surgery and conversion to open procedures were substantially correlated with factors including male gender, obesity, acute cholecystitis, dense adhesions, and increased gallbladder wall thickness. Even though laparoscopic cholecystectomy has been shown to be a safe and efficient surgical technique with better recovery results, open cholecystectomy is still a crucial procedure in cases of complex gallbladder disease and difficult technical situations. Minimizing postoperative problems and increasing overall patient outcomes after cholecystectomy need careful patient selection, prompt surgical intervention, sufficient preoperative assessment, and surgical competence.

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