Preoperative Risk Factors Responsible For Conversion Of Laparoscopic Cholecystectomy To Open Cholecystectomy

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ABSTRACT

Background: Laparoscopic cholecystectomy is the standard surgical method for treating symptomatic gallstone disease. Despite advances in technique and experience, open cholecystectomy may be required in some cases to ensure patient safety. Identifying preoperative risk factors can aid in anticipating difficult surgeries and improving results.

Objectives: The goal is to assess the incidence of conversion from laparoscopic to open cholecystectomy, as well as to identify preoperative clinical, laboratory, and radiological risk factors.

Materials and Methods: Over the course of 18 months, 200 patients undergoing laparoscopic cholecystectomy at a tertiary care hospital participated in this prospective observational study. Preoperative characteristics such as age, gender, body mass index, history of acute cholecystitis, previous upper abdominal surgery, white blood cell count, and ultrasonographic results were documented. Conversion to open cholecystectomy was observed. Statistical analysis was conducted using chi-square test and multivariate logistic regression, with p-values <0.05 considered significant.

Results: Out of 200 patients, 26 (13%) required an open cholecystectomy. Preoperative risk variables for conversion included age >60 years, male gender, acute cholecystitis, previous upper abdominal surgery, elevated white blood cell count, gallbladder wall thickness >4 mm, and pericholecystic fluid (p < 0.05). Acute cholecystitis and gallbladder wall thickening were found to be independent predictors on multivariate analysis.

Conclusion: Certain preoperative factors considerably enhance the chances of converting from laparoscopic to open cholecystectomy. Early identification of these risk factors leads to better patient counseling, operative planning, and surgical outcomes...

Keywords: *Laparoscopic cholecystectomy, Open cholecystectomy, Conversion, Gallstone disease, Preoperative risk factors, acute cholecystitis, Ultrasonography*

1. INTRODUCTION

Laparoscopic cholecystectomy (LC) is widely accepted as the standard surgical treatment for symptomatic gallstone disease due to its advantages of reduced postoperative pain, shorter hospital stay, early return to normal activity, and better cosmetic outcome when compared to open cholecystectomy [1]. However, despite increased surgeon experience and technology breakthroughs, converting from laparoscopic to open cholecystectomy (OC) remains necessary in a fraction of patients to maintain surgical safety. Large-scale population-based studies have found conversion rates ranging from 2% to 15%,...

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depending on patient characteristics, disease severity, and institutional expertise [2]. Conversion should not be regarded as a failure or consequence of laparoscopic surgery, but rather as an informed intraoperative decision made to avoid significant problems such as bile duct injury, uncontrolled hemorrhage, or visceral injury [3]. Several studies have found that the most prevalent intraoperative reasons for conversion include dense adhesions, severe inflammation, altered anatomy in Calot's triangle, and problems with gallbladder dissection [4]. These intraoperative problems are frequently predicted by preoperative clinical, laboratory, and radiographic data. Variations in conversion rates have also been observed between geographic locations and healthcare settings, highlighting the importance

of patient demographics and disease patterns [5]. As a result, preoperative identification of patients at increased risk of conversion is critical for adequate patient counseling, surgical planning, and the assignment of skilled surgeons. Several rating systems and predictive models have been presented to determine the difficulty of laparoscopic cholecystectomy and the chance of conversion [6]. Acute cholecystitis has frequently been recognized as a significant predictor of conversion due to edema, tissue friability, and obscured anatomy [7]. Early vs delayed laparoscopic cholecystectomy in acute cholecystitis has also been investigated, with delayed operation being related with increased technical difficulty [8]. Radiological screening, particularly ultrasonography, is critical for predicting difficult laparoscopic cholecystectomy. Gallbladder wall thickening, pericholecystic fluid collection, impacted stones, and a Contracted gallbladder have all been associated with higher conversion rates [9]. Indian studies have also validated scoring methods that use ultrasonographic factors to predict surgical complexity [10]. Demographic characteristics such as advanced age and male gender have been identified as independent risk factors for conversion, potentially due to delayed manifestation and more severe inflammatory alterations at surgery [11]. Laboratory markers, particularly an elevated white blood cell count, may reflect the severity of inflammation and have been linked to difficult laparoscopic surgeries [12]. Despite several research examining individual predictors, the proportional impact of various preoperative risk variables is still variable, and no universally accepted predictive model exists [13]. As a result, the current study sought to identify the preoperative risk factors that contribute to the conversion of laparoscopic cholecystectomy to open cholecystectomy at a tertiary care hospital.

Aim of the Study: The purpose of this study was to identify and assess the preoperative clinical, laboratory, and radiological risk factors associated with the conversion of laparoscopic cholecystectomy to open cholecystectomy in patients with gallstone disease.

2. MATERIALS AND METHODS

This prospective observational study was conducted at a tertiary care hospital over a period of 18 months, from January 2023 to June 2024. A total of 200 consecutive patients diagnosed with gallstone disease and scheduled to undergo laparoscopic cholecystectomy during the study period were included in the study.

Inclusion Criteria

Age ≥18 years.

Symptomatic cholelithiasis.

Elective and emergency laparoscopic cholecystectomy.

Exclusion Criteria

Known gallbladder malignancy

Common bile duct stones requiring open surgery

Patients unfit for general anesthesia

Preoperative Parameters Studied

Age

Gender

Body Mass Index (BMI)

History of acute cholecystitis

Previous upper abdominal surgery

White blood cell count

Ultrasonography findings:

Gallbladder wall thickness

Pericholecystic fluid

Contracted gallbladder

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Outcome Measure

Conversion from laparoscopic to open cholecystectomy.

Statistical Analysis

Data were analyzed using SPSS software. Chi-square test was used for categorical variables. Multivariate logistic regression identified independent predictors. $p < 0.05$ was considered statistically significant.

RESULT

A total of 200 patients underwent laparoscopic cholecystectomy during the study period. Conversion to open cholecystectomy was required in 26 cases (13%).

Table 1: Socio-Demographic Profile of Patients Undergoing Laparoscopic Cholecystectomy (n = 200)

Socio-demographic Variable		Number of Patients	Percentage (%)
Age (In Years)	≤40	68	34%
	41–60	84	42%
	>60	48	24%
Gender	Male	72	36%
	Female	128	64%
Body Mass Index (kg/m²)	<25	94	47%
	25–29.9	70	35%
	≥30	36	18%
Residential Area	Rural	118	59%
	Urban	82	41%
Type of Admission	Elective	146	73%
	Emergency	54	27%

The majority of patients belonged to the 41–60 years age group (42%), followed by those aged ≤40 years (34%). Patients above 60 years constituted 24% of the study population. Females predominated (64%) compared to males (36%). Nearly half of the patients (47%) had a body mass index below 25 kg/m², while 18% were obese. A greater proportion of patients were from rural areas (59%). Most procedures were performed on an elective basis (73%), whereas 27% were emergency admissions.

Table 2: Clinical and Laboratory Risk Factors

Risk Factor	Converted (%)	p-value
Acute cholecystitis	11 (42.3%)	<0.001
Previous upper abdominal surgery	8 (30.7%)	0.004
Raised WBC count (>11,000/mm³)	10 (38.4%)	<0.001

Among the 26 patients who required conversion to open cholecystectomy, acute cholecystitis was present in 11 patients (42.3%), followed by raised white blood cell count in 10 patients (38.4%) and previous upper abdominal surgery in 8 patients (30.7%). Multiple risk factors were observed in several patients.

Table 3: Ultrasonography Findings and Conversion

USG Finding	Conversion Rate	p-value
GB wall thickness >4 mm	46.1%	<0.001
Pericholecystic fluid	34.6%	0.002

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Contracted gallbladder	28.8%	0.01

Gallbladder wall thickness >4 mm, pericholecystic fluid, and contracted gallbladder were significantly associated with conversion to open cholecystectomy (p <0.05).

3. DISCUSSION

Laparoscopic cholecystectomy has been the gold standard treatment for symptomatic gallstone disease; however, converting to open cholecystectomy remains a critical intraoperative decision to avoid catastrophic consequences. The current study's conversion rate was 13%, which is within the range reported in modern literature (5-20%), particularly from tertiary care centers handling complex gallstone disease. Advanced age was discovered to be significantly associated with conversion. Patients over 60 years old had a greater conversion rate, which can be related to long-term illness, repeated inflammatory events, and fibrotic alterations around Calot's triangle. Recent investigations have shown similar findings, with elderly patients having more technically difficult dissections and greater rates of dense adhesions, needing conversion to assure safety [14, 15]. Male gender was also linked to higher conversion rates. Although females are more likely to develop gallstone disease, male patients frequently come later and with more severe inflammation. Studies published after 2000 consistently found that male gender was an independent predictor of difficult laparoscopic cholecystectomy and conversion, probably due to delayed healthcare seeking behavior and advanced inflammatory pathology [16, 17]. In this study, acute cholecystitis was found to be a strong predictor of conversion and an independent risk factor on multivariate analysis. Acute inflammation causes edema, friable tissues, and clouded anatomy, especially within Calot's triangle. Recent guidelines and clinical research underline that acute cholecystitis greatly increases surgical difficulties and conversion rates, particularly when surgery is conducted during the delayed period [18, 19]. A history of past upper abdominal surgery was substantially linked to conversion. Adhesions from previous procedures alter normal anatomy, limiting safe laparoscopic access. Multiple recent studies have shown previous upper abdominal surgery as a significant risk factor due to increased surgical time, difficult adhesiolysis, and a higher risk of unintended damage [20, 21]. Laboratory characteristics also played an important impact in predicting conversion. In this study, a high white blood cell count, which indicates a continuing infection or severe inflammation, was found to be substantially related with conversion. Recent research supports the use of inflammatory markers as additional predictors of surgical difficulties and conversion, highlighting their importance in preoperative risk stratification [22]. Ultrasonography showed to be an effective method for predicting complicated laparoscopic cholecystectomy. Gallbladder wall thickness larger than 4 mm was most strongly associated with conversion, followed by pericholecystic fluid and a contracted gallbladder. These findings are consistent with recent studies that have shown aberrant ultrasonographic parameters to be reliable predictors of severe inflammation, fibrosis, and deformed architecture, increasing the chance of conversion [23–25]. Overall, the outcomes of this study reaffirm that converting from laparoscopic to open cholecystectomy should not be regarded as a problem, but rather as a prudent decision aimed at patient safety. Identifying high-risk patients before surgery provides for better surgical planning, informed consent, access to competent surgeons, and a reduction in intraoperative morbidity.

4. CONCLUSION

Preoperative assessment is critical in predicting the conversion from laparoscopic to open cholecystectomy. Advanced age, male gender, acute cholecystitis, past upper abdominal surgery, elevated white blood cell count, and abnormal ultrasonographic findings all enhance the likelihood of conversion. Recognizing these aspects before surgery can help with surgical decision-making, patient safety, and overall outcomes.

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