

Factors Influencing the Conversion to Open Surgery in Patients Undergoing Elective Laparoscopic Cholecystectomy

Mohammad Fazlul Haque^{1*}, Atikul Ahsan², Rezwana Alam³

Received: 11 May 2026
Accepted: 18 May 2026
Published Online: 5 June 2026

Published by:
Gopalganj Medical College, Gopalganj,
Bangladesh

*Corresponding Author

DOI: 10.5281/zenodo.20551327

Copyright © 2026 The Insight



This article is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).



ABSTRACT

Background: Conversion from laparoscopic to open cholecystectomy remains an important quality and safety indicator. Identifying factors influencing conversion in elective cases can improve patient counseling and intraoperative decision-making. **Methods & Materials:** This observational study was conducted in the Department of Hepatobiliary and Pancreatic Surgery, Shaheed Suhrawardy Medical College & Hospital, Dhaka, Bangladesh, from January 2023 to December 2023. The study included 100 patients undergoing elective laparoscopic cholecystectomy at a tertiary hospital in Bangladesh. Demographic, clinical, imaging, and intraoperative data were recorded and analyzed descriptively to determine factors associated with conversion. **Results:** Most patients were aged 31–40 years (36%) with a female predominance (59%). Symptomatic cholelithiasis was the main indication (90%). Hypertension (56%) and diabetes (20%) were the most common comorbidities. Preoperative risk features were present in 16% of cases, with thickened gallbladder wall (5%) being the most frequent. Conversion to open surgery occurred in 2 patients (2.0%, 95% CI: 0.6–7.0), both due to intraoperative complications-bile duct injury and hemorrhage. The converted cases were older (mean 62.5 ± 3.0 years), suggesting age and intraoperative events as dominant risk factors. **Conclusion:** Conversion during elective laparoscopic cholecystectomy remains infrequent and primarily reflects intraoperative judgment in high-risk or elderly patients. Early recognition of technical difficulty and readiness to convert safely are essential to prevent major complications.

Keywords: Laparoscopic cholecystectomy, Conversion, Risk factors, Bile duct injury, Elective surgery.

(The Insight 2026; 9(2): 307-310)

1. Associate Professor, Department of Surgery, Bangabandhu Sheikh Mujib Medical College Hospital, Faridpur, Bangladesh (ORCID: 0009-0000-4288-6258)
2. Assistant Professor, Department of Surgery, Bangabandhu Sheikh Mujib Medical College Hospital, Faridpur, Bangladesh
3. Consultant, Department of Surgery, Bangabandhu Sheikh Mujib Medical College Hospital, Faridpur, Bangladesh

INTRODUCTION

Laparoscopic cholecystectomy (LC) is now universally recognized as the standard operative procedure for symptomatic gallstone disease, replacing open cholecystectomy in nearly all elective and emergency settings because of its reduced postoperative pain, shorter hospital stays, and faster return to normal activity [1,2]. Despite its broad adoption, LC remains a technically demanding procedure, and conversion to open cholecystectomy (OC) is sometimes required as a deliberate intraoperative decision to prevent complications such as bile duct injury, uncontrolled hemorrhage, or uncertain biliary anatomy [3]. Conversion is therefore not regarded as a surgical failure but as a necessary safety measure when laparoscopic dissection becomes hazardous [4]. However, each conversion carries consequences, prolonged operative time, increased risk of postoperative complications, extended hospital stays, and higher costs, making it an important quality indicator of surgical performance and training.[5] Globally, reported conversion rates vary between 3 and 10 percent, depending on the clinical presentation, patient profile, and disease severity [2,3,6]. Systematic reviews and large multicenter series show that elective LC in uncomplicated cholelithiasis typically converts in about 2–4 percent of cases, whereas the rate rises to 8–15 percent in acute cholecystitis due to distorted anatomy and inflammatory adhesions [7,8]. A 2023 meta-analysis comparing early and delayed LC for acute cholecystitis found an overall conversion of 7.5%, reinforcing that acute inflammation and delayed intervention are major determinants [6]. Another meta-analysis by Cirocchi et al. demonstrated that elective procedures consistently had significantly lower conversion rates than emergency operations performed for acute gallbladder inflammation [9]. These findings suggest that case selection and timing are crucial for reducing conversion risk. Several patient- and disease-related factors have been repeatedly identified as predictors of conversion. Preoperative variables include advanced age, male sex, obesity, diabetes mellitus, prior upper abdominal surgery, and biochemical or radiological evidence of severe inflammation such

as elevated liver enzymes, thickened gallbladder wall, or dilated common bile duct [3,10,11]. Radiological parameters, particularly gallbladder wall thickness exceeding 4 mm and a common bile duct diameter over 6 mm, have strong predictive value, reflecting chronic inflammation or biliary obstruction [11]. Hu et al. also highlighted acute cholecystitis as a leading risk factor, tripling the odds of conversion [2]. Intraoperative challenges remain the most immediate triggers, with dense adhesions in Calot's triangle, severe inflammation, and obscure biliary anatomy being responsible for up to 40 percent of conversions, followed by bleeding and suspected bile duct injury [4,12]. These findings collectively underscore that conversion results from a combination of patient factors, disease stage, and technical limitations encountered during surgery. While conversion has been studied extensively in Western and multicenter cohorts, data from South Asia, and Bangladesh in particular, remain sparse and inconsistent. Existing Bangladeshi studies report conversion rates at the lower edge of global ranges, between 4% and 7%, but most combine both elective and emergency cases without detailed evaluation of preoperative imaging or laboratory predictors [13]. Similarly, regional studies from Pakistan, Sri Lanka, and India show heterogeneous results, often between 6 and 10 percent, reflecting variations in case mix, hospital infrastructure, and surgeon experience [14–16]. Despite LC being the dominant approach for gallstone disease, there is no nationally representative database or multicenter audit in Bangladesh to monitor conversion trends or outcomes [16,17]. Moreover, few regional studies isolate elective LC cohorts with comprehensive documentation of biochemical and ultrasonographic variables such as gallbladder wall thickness, pericholecystic fluid, and common bile duct diameter. As a result, surgeons lack locally validated data to guide preoperative risk counseling and anticipate technical difficulty. Existing literature highlights the need for high-quality, prospective data that link preoperative assessments with intraoperative findings and postoperative outcomes in Bangladeshi patients. Identifying and quantifying these factors can improve patient selection, surgical

planning, and resource allocation, especially in tertiary centers where both elective and emergency cholecystectomies are performed. Against this background, the present study was designed to determine the rate of conversion to open surgery among patients undergoing elective laparoscopic cholecystectomy in a tertiary care hospital in Bangladesh and to examine the preoperative and intraoperative factors influencing conversion. By focusing exclusively on elective cases and capturing detailed demographic, clinical, laboratory, and imaging variables, this study aims to generate context-specific data for the Bangladeshi population. The findings will help develop risk-based preoperative evaluation protocols and enhance surgical decision-making for safe and effective management of gallstone disease.

METHODS & MATERIALS

This prospective observational study was conducted at the Department of Hepatobiliary and Pancreatic Surgery, Shaheed Suhrawardy Medical College & Hospital, Dhaka, Bangladesh. The study duration was January to December 2023. We enrolled consecutive adults scheduled for elective laparoscopic cholecystectomy who gave written informed consent. We excluded patients with acute cholecystitis longer than seven days and those with gallbladder cancer. We used a standardized case record form. We recorded age, sex, body mass index, comorbidities, history of prior abdominal surgery, and ASA status. We documented complete blood count and liver function tests, including

bilirubin and alkaline phosphatase. Preoperative ultrasound findings included gallbladder wall thickness, contracted gallbladder, number of stones, and common bile duct diameter. When performed, MRCP findings, including ductal dilation, were noted. The primary outcome was intraoperative conversion to open cholecystectomy. Surgeons made conversion decisions based on intraoperative safety. We also recorded intraoperative events and the reason for conversion, including bleeding and suspected bile duct injury. The sample size was fixed at 100 due to the one-year enrollment window. We entered data into SPSS version 21. We summarized categorical variables as counts and percentages. We summarized continuous variables as means with standard deviations or medians with interquartile ranges, as appropriate. Given the small number of conversion events, we limited analyses to descriptive statistics, where informative. The Institutional Ethics Committee approved the study. All participants provided written informed consent. We maintained confidentiality and stored data securely.

RESULTS

Table 1 shows that most elective laparoscopic cholecystectomy patients were between 31 and 40 years of age (36 %), followed by 20–30 years (28 %). Only 16 % were aged over 50 years. Females were the majority (59 %), and symptomatic cholelithiasis was the main indication (90 %), with 10 % operated for acute cholecystitis of less than 7 days.

Table I: Baseline characteristics of elective LC patients, n=100

Variable	Category	n (%)
Age group, years	20–30	28 (28)
	31–40	36 (36)
	41–50	20 (20)
	51–60	11 (11)
	≥61	5 (5)
Sex	Male	41 (41)
	Female	59 (59)
Indication	Symptomatic cholelithiasis	90 (90)
	Acute cholecystitis less than 7 days	10 (10)

Table 2 indicates that more than half of the patients had hypertension (56 %). Diabetes (20 %), chronic obstructive pulmonary disease (15

%), and ischemic heart disease (5 %) were less frequent. Only 3 % had a history of previous abdominal surgery, and 1 % were obese.

Table II: Comorbidities and prior surgery, n=100

Condition	n (%)
Hypertension	56 (56)
Diabetes mellitus	20 (20)
COPD	15 (15)
Ischemic heart disease	5 (5)
Previous abdominal surgery	3 (3)
Obesity	1 (1)

Table 3 shows that 16 % of patients had at least one identifiable preoperative risk feature for conversion. The most frequent finding was a thickened gallbladder wall on ultrasound (5 %). Contracted gallbladder, dilated common bile duct on MRCP, abnormal liver

function tests, and recent acute cholecystitis were each present in 2 % of cases. Hypertension and previous abdominal surgery were also each noted in 2 % and 1 %, respectively.

Table III: Preoperative risk features observed in the cohort, n=100

Feature	n (%)
USG thick gallbladder wall	5 (5)
Contracted gallbladder	2 (2)
MRCP dilated CBD	2 (2)
Abnormal LFTs, bilirubin or ALP	2 (2)
Recent acute cholecystitis, raised CBC or CRP	2 (2)
Comorbidity, hypertension	2 (2)
History of previous abdominal surgery	1 (1)
Total patients with at least one listed feature	16 (16)

Table 4 shows that conversion to open cholecystectomy occurred in 2 of 100 cases, giving a conversion rate of 2.0 percent (95 percent CI 0.6–7.0). Each conversion was related to an intraoperative complication—

one for bile duct injury and one for uncontrolled hemorrhage. The two converted patients had a mean age of 62.5 years and an even sex distribution, with one male and one female.

Table IV: Conversion rate, intraoperative reasons, and characteristics of converted cases (n = 100)

Parameter	Category or value	n (%) or value
Conversion summary	Total conversions	2 (2.0)
	95 percent CI for conversion rate	0.6 – 7.0
Intraoperative reasons for conversion	Bile duct injury	1 (1.0)
	Hemorrhage	1 (1.0)
Converted case characteristics	Mean age $\pm$ SD (years)	62.5 $\pm$ 3.0
	Sex – Male	1 (50.0)
	Sex – Female	1 (50.0)

DISCUSSION

The present study evaluated factors influencing conversion to open surgery in patients undergoing elective laparoscopic cholecystectomy (LC) in a Bangladeshi tertiary hospital. The cohort was dominated by young and middle-aged adults, with 64% of patients between 20 and 40 years of age and a female predominance of 59%. This demographic pattern aligns closely with several regional and international reports showing that gallstone disease primarily affects women of reproductive age, typically between 30 and 45 years [18-20]. Symptomatic cholelithiasis was the principal indication for surgery in 90% of cases, reflecting global practice trends where uncomplicated gallstone disease remains the most common reason for elective LC [21,22]. Comorbid conditions were frequent in this series, with hypertension present in 56% and diabetes in 20% of patients. Comparable figures have been documented by Garg et al. and Abbasi et al., who identified hypertension and diabetes as common systemic comorbidities in LC populations and as potential contributors to increased operative complexity [23,24]. In the current study, preoperative imaging features such as thickened gallbladder wall (5%), contracted gallbladder (2%), and dilated common bile duct (2%) were observed in a minority of patients. These findings are consistent with earlier meta-analyses by Magnano San Lio et al. and Chin et al., which recognized gallbladder wall thickening, CBD dilation, and adhesions as significant preoperative predictors of difficult LC and possible conversion [1,3]. The conversion rate in this study was 2%, which falls at the lower end of the reported global range of 2% to 10% [2,25]. Conversion in both cases was necessitated by serious intraoperative events—one bile duct injury and one hemorrhage—illustrating the accepted principle that conversion represents a safety decision rather than a procedural failure. The causes identified in this cohort correspond with those described in multiple systematic reviews, where hemorrhage, unclear anatomy, and bile duct injury consistently emerge as the leading intraoperative drivers for conversion [1,12]. Notably, both converted patients were elderly, with a mean age of 62.5 years, suggesting that advanced age may predispose to technical difficulty and complications. Similar findings have been observed in international meta-analyses reporting significantly higher conversion and bleeding rates in patients aged over 60 years [26,27]. The absence of a sex difference among converted cases in this series is also in agreement with Hu et al., who reported inconsistent sex-based effects on conversion risk [2]. Overall, the present study reinforces that while preoperative imaging abnormalities and comorbidities may alert the surgical team to potential technical challenges, advanced age and intraoperative complications remain the most decisive factors leading to conversion in elective LC. The low conversion rate observed reflects both appropriate case selection and adherence to the safety principle of early conversion when dissection becomes hazardous. These findings are consistent with global data and highlight the importance of maintaining a low threshold for conversion to optimize outcomes and prevent severe bile duct injury.

LIMITATIONS

This study was conducted in a single tertiary center with a modest sample size of 100 elective cases, which may limit generalizability. The absence of statistical modeling due to the low number of conversions restricts identification of independent predictors. Long-term postoperative outcomes were not included.

CONCLUSION

Elective laparoscopic cholecystectomy demonstrated a low conversion rate of 2%, well within international safety benchmarks. Advanced age and intraoperative complications, particularly bile duct injury and hemorrhage, were the primary factors associated with conversion.

Preoperative imaging abnormalities and comorbidities showed limited predictive value. These findings emphasize careful intraoperative decision-making and maintaining a low threshold for conversion to prevent serious complications.

RECOMMENDATIONS

Pre-operative patient assessment should play an important role in surgical scheduling, particularly among the elderly. The results of the ultrasound examination should be thoroughly analyzed. Surgeons should aim to convert to surgery early if there is any uncertainty about the anatomy or any bleeding occurs.

FUNDING

No funding sources

CONFLICT OF INTEREST

None declared

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee

REFERENCES

- Chin X, Mallika Arachchige S, Orbell-Smith J, Wysocki AP. Preoperative and Intraoperative Risk Factors for Conversion of Laparoscopic Cholecystectomy to Open Cholecystectomy: A Systematic Review of 30 Studies. *Cureus*. 2023 Oct;15(10):e47774.
- Hu ASY, Menon R, Gunnarsson R, de Costa A. Risk factors for conversion of laparoscopic cholecystectomy to open surgery - A systematic literature review of 30 studies. *Am J Surg*. 2017 Nov;214(5):920–30.
- Magnano San Lio R, Barchitta M, Maugeri A, Quartarone S, Basile G, Agodi A. Preoperative Risk Factors for Conversion from Laparoscopic to Open Cholecystectomy: A Systematic Review and Meta-Analysis. *Int J Environ Res Public Health* [Internet]. 2022 Dec 27 [cited 2025 Nov 6];20(1):408. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC9819914/>
- Khakimov M, Karimov R, Sabanovic J, Patel B. "Intraoperative reasons for conversion of laparoscopic cholecystectomy to open surgery systematic review" systematic review. *Health Sciences Review* [Internet]. 2022 Sep 1 [cited 2025 Nov 6];4:100035. Available from: <https://www.sciencedirect.com/science/article/pii/S2772632022000241>
- Coffin SJ, Wrenn SM, Callas PW, Abu-Jaish W. Three decades later: investigating the rate of and risks for conversion from laparoscopic to open cholecystectomy. *Surg Endosc*. 2018 Feb;32(2):923–9.
- Wu H, Liao B, Cao T, Ji T, Huang J, Luo Y, et al. Comparison of the safety profile, conversion rate and hospitalization duration between early and delayed laparoscopic cholecystectomy for acute cholecystitis: a systematic review and meta-analysis. *Front Med (Lausanne)* [Internet]. 2023 Dec 11 [cited 2025 Nov 6];10:1185482. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC10750350/>
- Coccolini F, Solaini L, Binda C, Catena F, Chiarugi M, Fabbri C, et al. Laparoscopic Cholecystectomy in Acute Cholecystitis: Refining the Best Surgical Timing Through Network Meta-Analysis of Randomized Trials. *Surg Laparosc Endosc Percutan Tech*. 2022 Dec 1;32(6):755–63.
- Gallagher TK, Kelly ME, Hoti E. Meta-analysis of the cost-effectiveness of early versus delayed cholecystectomy for acute cholecystitis. *BJS Open*. 2019 Apr;3(2):146–52.

9. Cirocchi R, Amato L, Ungania S, Buononato M, Tebala GD, Cirillo B, et al. Management of Acute Cholecystitis in High-Risk Patients: Percutaneous Gallbladder Drainage as a Definitive Treatment vs. Emergency Cholecystectomy-Systematic Review and Meta-Analysis. *J Clin Med*. 2023 Jul 26;12(15):4903.
10. Warchałowski Ł, Łuszczki E, Bartosiewicz A, Dereń K, Warchałowska M, Oleksy Ł, et al. The Analysis of Risk Factors in the Conversion from Laparoscopic to Open Cholecystectomy. *Int J Environ Res Public Health*. 2020 Oct 18;17(20):7571.
11. Philip Rothman J, Burcharth J, Pommergaard HC, Viereck S, Rosenberg J. Preoperative Risk Factors for Conversion of Laparoscopic Cholecystectomy to Open Surgery - A Systematic Review and Meta-Analysis of Observational Studies. *Dig Surg*. 2016;33(5):414–23.
12. Tang B, Cuschieri A. Conversions during laparoscopic cholecystectomy: risk factors and effects on patient outcome. *J Gastrointest Surg*. 2006;10(7):1081–91.
13. Sardar A, Sardar A. Advancement and Implementation of Laparoscopic Surgery in a Tertiary Care Hospital. *Planet (Barisal)* [Internet]. 2024 Dec 14;7(02):8–13. Available from: <https://bdjournals.org/planet/article/view/552>
14. Iftikhar N, Naeem M, Ansari SS, Shaikh AR. Frequency of Conversion of Laparoscopic Cholecystectomy to Open Cholecystectomy in a Low-Middle-Income Country. *Journal of Community Medicine & Public Health* [Internet]. 2023 Aug 21 [cited 2025 Nov 6]; Available from: <https://www.gavinpublishers.com/article/view/frequency-of-conversion-of-laparoscopic-cholecystectomy-to-open-cholecystectomy-in-a-low-middle-income-country>
15. Abeyesuriya V, Chandrasena L. Outcomes Of Early Cholecystectomy In Acute Cholecystitis: Prospective 10-Year Experience In A Private Sector Tertiary Care Hospital In Sri Lanka. *Journal of Society of Surgeons of Nepal* [Internet]. 2024 Dec 31 [cited 2025 Nov 6];27(2):53–6. Available from: <https://www.nepjol.info/index.php/JSSN/article/view/76230>
16. Zadey S, Rao S, Gondi I, Sheneman N, Patil C, Nayan A, et al. Achieving Surgical, Obstetric, Trauma, and Anesthesia (SOTA) care for all in South Asia. *Front Public Health* [Internet]. 2024 Feb 21 [cited 2025 Nov 6];12. Available from: <https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2024.1325922/full>
17. Lunevicius R. Insights from Global, National, and Local Studies of Benign Biliary Disease for 2023. In: *Gallstone Disease - Newer Insights and Current Trends* [Internet]. IntechOpen; 2024 [cited 2025 Nov 6]. Available from: <https://www.intechopen.com/chapters/89410>
18. Hayat N, Badar-u-Duja. TO DETERMINE THE IMPORTANCE OF AGE AND SEX IN THE CLINICAL PRESENTATION AND SUBSEQUENT OUTCOME IN CHOLILITHIASIS. *Journal of University Medical & Dental College* [Internet]. 2013 [cited 2025 Nov 6];4(1):36–41. Available from: <https://www.jumdc.com/index.php/jumdc/article/view/316>
19. Bansal A, Akhtar M, Bansal AK. A clinical study: prevalence and management of cholelithiasis. *International Surgery Journal* [Internet]. 2014 [cited 2025 Nov 6];1(3):134–9. Available from: <https://www.ijurgery.com/index.php/ij/article/view/455>
20. Dewana AM, Namq AJ, Ahmed BS, Baban AA. Optimal timing for cholecystectomy: unveiling insights from a decade-long study on acute cholecystitis and symptomatic cholecystolithiasis. *BMC Surg*. 2025 May 7;25(1):199.
21. Karmacharya A, Malla BR, Joshi HN, Gurung RB, Rajbhandari M. The predictive value of pre-operative symptoms including upper gastrointestinal endoscopy before laparoscopic cholecystectomy for elective symptomatic cholecystolithiasis. *Kathmandu Univ Med J (KUMJ)*. 2013;11(44):300–4.
22. Pimpale R, Katakwar P, Akhtar M. Cholelithiasis: causative factors, clinical manifestations and management. *International Surgery Journal* [Internet]. 2019 May 28 [cited 2025 Nov 6];6(6):2133–8. Available from: <https://www.ijurgery.com/index.php/ij/article/view/4202>
23. Garg R, Mohi RS, Chahal R, Sonia, Gupta K, Kaur D, et al. Study of Preoperative predictive factors for difficult Laparoscopic Cholecystectomy. *European Journal of Cardiovascular Medicine* [Internet]. 2025 May 30 [cited 2025 Nov 6];15:761–6. Available from: <https://healthcare-bulletin.co.uk/article/study-of-preoperative-predictive-factors-for-difficult-laparoscopic-cholecystectomy-3475/>
24. Abbasi KH, Ahmed I, Khattar SN, Shah A, Rehman M ur, Alam I. Preoperative and Operative Risk Factors Associated with the Conversion of Laparoscopic Cholecystectomy to Open Surgery. *International Journal of Pharmacy Research & Technology (IJPR)* [Internet]. 2025 May 29 [cited 2025 Nov 6];15(1):1077–81. Available from: <https://www.ijprt.org/index.php/pub/article/view/532>
25. Griniatsos J. Factors predisposing to conversion from laparoscopic to open cholecystectomy. *Annals of Laparoscopic and Endoscopic Surgery* [Internet]. 2018 Feb 10 [cited 2025 Nov 6];3(2). Available from: <https://ales.amegroups.org/article/view/4358>
26. Kamarajah SK, Karri S, Bundred JR, Evans RPT, Lin A, Kew T, et al. Perioperative outcomes after laparoscopic cholecystectomy in elderly patients: a systematic review and meta-analysis. *Surg Endosc*. 2020 Nov;34(11):4727–40.
27. Yang S, Hu S, Gu X, Zhang X. Analysis of risk factors for bile duct injury in laparoscopic cholecystectomy in China: A systematic review and meta-analysis. *Medicine (Baltimore)*. 2022 Sep 16;101(37):e30365.