Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1834
Original Article

CROSS-SECTIONAL STUDY OF FACTORS PREDICTING CONVERSION FROM LAPAROSCOPIC TO OPEN CHOLECYSTECTOMY.

Dr. Anil Kumar Kamal[1], Dr. Deepak Kumar[2,*],Dr. Samir Toppo[3], Dr. Kumar Gaurav[1],Dr.Kamlesh Kumar[5],Dr. Krishan Kumar[5], Dr. Archana[4], Dr. Ranjeet Kumar Rajak[2]

[1]Associate Professor, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi
[2]Junior Resident, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi
[3]Additional Professor, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi
[4]Senior Resident, Department of Anaesthesiology, Rajendra Institute of Medical Sciences, Ranchi
[5]Senior Resident, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi

Abstract

Background

Laparoscopic cholecystectomy (LC) has become the gold standard procedure for the surgical management of gallstone disease due to its minimally invasive nature and faster recovery. However, conversion to open cholecystectomy (OC) is occasionally required in technically difficult cases, "potentially leading to increased morbidity, prolonged hospitalization, and higher healthcare costs. Identifying the factors associated with such conversions is essential for optimizing surgical outcomes and patient safety.

Objective

This study aims to determine the demographic, clinical, sonographic, and intraoperative factors that predict conversion from laparoscopic to open cholecystectomy in patients undergoing elective surgery for gallbladder disease.

Methods

The General Surgery Department of Rajendra Institute of Medical Sciences (RIMS), Ranchi, undertook this cross-sectional observational study. Based on inclusion and exclusion criteria, 100 elective laparoscopic cholecystectomy patients were included. Age, sex, BMI, clinical history, ultrasonographic findings, and intraoperative observations were gathered using a structured proforma. Conversion to open cholecystectomy was the main result. Statistical analysis used chi-square, t-tests, and multivariate logistic regression with a significance level of $p < 0.05$.

Results

Total conversion was 18%. In particular, 30% of patients over 50, 40.9% of those with BMI >30, and 27.8% of those with acute cholecystitis converted. Sonography showed conversion in 36.7% with gallbladder wall thickness >3 mm and 38.9% with pericholecystic fluid. Distorted Calot's triangle converted 50% and dense adhesions 42.9% intraoperatively. Significant predictors include age >50 (p=0.01), BMI >30 (p=0.002), acute cholecystitis history (p=0.006), gallbladder wall thickness >3 mm (p=0.001), and extensive intraoperative adhesions (p<0.001). These findings indicate that preoperative and intraoperative factors greatly influence conversion.

Conclusion

Identification of high-risk patients through thorough preoperative evaluation can facilitate surgical planning and improve outcomes. Incorporating predictive models into routine clinical practice may help reduce unnecessary conversions and associated complications.

Keywords: Laparoscopic cholecystectomy, open cholecystectomy, conversion rate, predictive factors, gallstones.
Submitted: *2025-04-10* ***Accepted:*** *2025-05-06* ***Published:*** *2025-06-01*

Corresponding Author: *Dr. Deepak Kumar*
Email: ***dkumar7543@gmail.com***
Junior Resident, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi

Introduction

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1834
Original Article

Laparoscopic cholecystectomy is the most common surgery for symptomatic gallstone illnesses like cholelithiasis, chronic cholecystitis, and gallbladder polyps. Since the late 1980s, minimally invasive cholecystectomy (LC) has revolutionized general surgery [1]. Patients had a shorter hospital stay, less pain, faster healing, and better cosmetic results than with open cholecystectomy. Despite these benefits, switching from LC to OC following surgery is unavoidable and sometimes necessary [2]. While there is no failure to convert, the conversion procedure is associated with longer operating durations, more difficulties, longer recovery times, and higher healthcare costs. Therefore, surgical research and practice have shifted dramatically towards identifying characteristics that predict this conversion [3]. LC may be changed to OC for intraoperative issues such as anatomical deformation, thick adhesions, uncontrolled bleeding, or trouble delineating Calot's triangle. Several preoperative characteristics have been associated with greater conversion rates, however intraoperative issues are uncertain [4]. A thicker gallbladder wall or pericholecystic fluid collection are abnormal ultrasonographic outcomes. Advanced age, male gender, obesity, abdominal surgeries, acute or chronic cholecystitis, and other medical disorders are also risk factors. Knowing these factors before surgery helps the surgical team counsel the patient and prepare for the procedure. It also ensures conversion materials and information are accessible [5].

Laparoscopic cholecystectomy is becoming standard in Indian tertiary care institutions, where gallstone disease is rising due to diet and inactivity. However, resource constraints, delayed patient presentations, and surgical expertise make the LC-to-OC conversion rate more significant [6]. Even though laparoscopic treatments and technology have evolved, surgeons must do open surgery for patient safety [7]. Understanding demographic and clinical parameters in India, particularly at RIMS, Ranchi can help build institution-specific policies to minimize conversion rates and improve performance. Complexity is more significant than surgeon competence when deciding to transition to open surgery. When done by a trained practitioner, conversion can prevent bile duct injury, uncontrolled bleeding, and organ damage. Each conversion causes mental and physical agony, which may lead to medicolegal issues for the surgeon. The therapeutic and medico-administrative consequences of correct conversion forecasting are huge [8].

Several multinational projects have used preoperative factors to construct grading systems or predictive models to assess conversion. These methods have had mixed results, but India's diverse population and healthcare system make them challenging to adopt. RIMS, Ranchi serves semi-urban and rural residents, yet there is little research on them [9]. Region-specific research is needed since LC patients in these settings have different demographics and clinical profiles than those in urban areas. Laparoscopic surgery learning curves also affect conversion rates [10]. When surgical residents work under faculty supervision at academic institutions like RIMS, results may vary depending on the surgeon's experience and the procedure. Thus, institution audits and conversion cause studies may benefit surgical education and care. They can identify areas that need training or protocol improvements to increase patient safety and reduce conversion [11].

Ultrasonography, a common preoperative imaging procedure for gallbladder pathology, can predict surgical problems. Gallbladder wall thickness (>3 mm), pericholecystic fluid, impacted stones at the neck, and a restricted gallbladder indicate ongoing inflammation and fibrosis. Anatomy changes can make dissection harder and increase conversion [12]. A full analysis of sonographic characteristics and clinical history can provide a non-invasive and cost-effective surgical risk assessment technique. This research from Ranchi's Rajendra Institute of Medical Sciences (RIMS) identifies and quantifies intraoperative, demographic, clinical, and ultrasonographic variables that affect LC-to-OC conversion. The goal is to uncover predictive indicators and provide relevant information for everyday surgery. The study aims to enhance patient outcomes by profiling high-risk people for conversion. This profile will be used to better assess patients before surgery, conduct more productive informed consent conversations, optimize surgical planning, etc. Therefore, the objective of this study is to determine the demographic, clinical, sonographic, and intraoperative factors that predict conversion from laparoscopic to open cholecystectomy in patients undergoing elective surgery for gallbladder disease at RIMS, Ranchi.

Also, this study will examine the synergistic effect of risk factor combinations on conversion likelihood. Gallbladder wall thickening and high BMI may be worse together. If we understand such relationships, risk assessment may become more sophisticated and personalized. Locally customized

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1834
Original Article

scoring systems may help triage patients in high-volume facilities with limited operating room availability. The study also aims to demonstrate the importance of reducing early conversion barriers in difficult situations. Postponing conversion to finish laparoscopically can avert problems. An objective risk assessment and intraoperative judgment-based proactive strategy improves results. This reinforces the impression that conversion is based on surgical skill and patient safety, not failure. Finally, while laparoscopic cholecystectomy is increasingly standard, open surgery should not be ruled out. This project will rigorously examine conversion determinants in a tertiary care teaching hospital like RIMS, Ranchi to improve clinical practice, training, and patient care. The goal is to improve laparoscopic cholecystectomy predictability, efficiency, and safety in various clinical settings. Evidence-based practices help the surgical community improve and provide the greatest treatment to patients.

Methodology

Study Design

This cross-sectional observational study was conducted to identify risk factors for conversion from laparoscopic to open cholecystectomy after laparoscopic surgery. This design was chosen to investigate the association between various patient characteristics, clinical findings, and intraoperative observations with the outcome of surgical conversion. Patients from across Jharkhand were studied in the Department of General Surgery at the tertiary care teaching hospital Rajendra Institute of Medical Sciences (RIMS), Ranchi. The study examined whether clinical, ultrasonographic, demographic, and surgical factors affect conversion rate.

Study Setting and Duration

The study was conducted at the famed RIMS, Ranchi, a government hospital with advanced laparoscopic and open surgical facilities. After meeting the study's eligibility criteria, elective laparoscopic cholecystectomy patients were enrolled sequentially. Observing experienced faculty and postgraduate residents perform surgical procedures provided a representative sampling of academic operating conditions.

Sample Size and Sampling Method

A total of 100 patients undergoing laparoscopic cholecystectomy were included in the study. This sample size was chosen based on a feasibility analysis considering the average caseload of elective laparoscopic cholecystectomies performed at RIMS, Ranchi, during the study period. While a formal power calculation was not performed for this exploratory study, 100 participants were deemed sufficient to detect statistically significant associations for common predictors, given the observed conversion rates in similar literature. A consecutive sampling method was used to ensure unbiased inclusion of eligible cases. All patients were informed about the study, and written informed consent was obtained before enrollment.

Inclusion Criteria

Patients diagnosed with gallstone disease or chronic cholecystitis are scheduled for LC.
Age ≥ 18 years
Provided informed consent

Exclusion Criteria

Emergency cholecystectomy for perforated gallbladder
Known malignancy

Data Collection Procedure

Demographics, clinical history, imaging results, and intraoperative notes were collected using a pretested and standardized proforma. Age, gender, and BMI were collected. Clinical symptoms such as biliary colic, past abdominal procedures, acute or recurring cholecystitis, and others were reported in patient interviews and medical records. Gallbladder wall thickness (>3 mm), pericholecystic fluid collection, stone impaction in the neck or cystic duct, and expansion or contraction were relevant preoperative ultrasonographic findings. Radiological markers can detect inflammation and surgical complications. Once the surgery was over, the surgeon scrupulously collected intraoperative data. Technical issues include extensive adhesions in the right upper quadrant,

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1834
Original Article

gallbladder perforation, hemorrhage that obscured sight, or Calot's triangle anatomy may necessitate open cholecystectomy. After assessing patient safety and operation feasibility, the surgeon converted.

Outcome Measure

The primary outcome of interest was the conversion from laparoscopic to open cholecystectomy. Each case was evaluated to determine whether the procedure was completed laparoscopically or required conversion. The reasons for conversion were also recorded and categorized based on intraoperative findings.

Statistical Analysis

All data was entered and analyzed using SPSS or Excel. Descriptive statistics like percentages, frequencies, standard deviations, and averages summarised patient characteristics and surgery results. We employed t-tests for continuous variables like age and BMI and chi-square tests for categorical variables like gender and acute cholecystitis history for conversion associations. We searched for independent conversion factors using binary logistic regression. Multivariate model factors had a big impact on univariate studies. The conversion-risk variable connection was measured using odds ratios (ORs) with 95% CIs. All analyses were statistically significant when $p < 0.05$.

Ethical Considerations

The RIMS, Ranchi Institutional Ethics Committee approved the study with an Ethical Clearance Number. All patients were enrolled after obtaining complete study information. Patient data was protected throughout the research process. The trial did not cost patients or require any further treatments. To improve surgical decision-making and outcomes in similar healthcare settings, our methodology extensively investigated and validated clinical and surgical variables that lead to LC-to-OC conversion.

Results

A total of 120 patients were screened for eligibility for elective laparoscopic cholecystectomy during the study period. Of these, 10 patients were excluded due to presenting with acute cholecystitis requiring emergency surgery, 5 patients had known gallbladder malignancy, and 5 patients declined to participate. Thus, 100 patients were confirmed eligible and included in the study. All 100 patients completed the study and their data were analyzed.

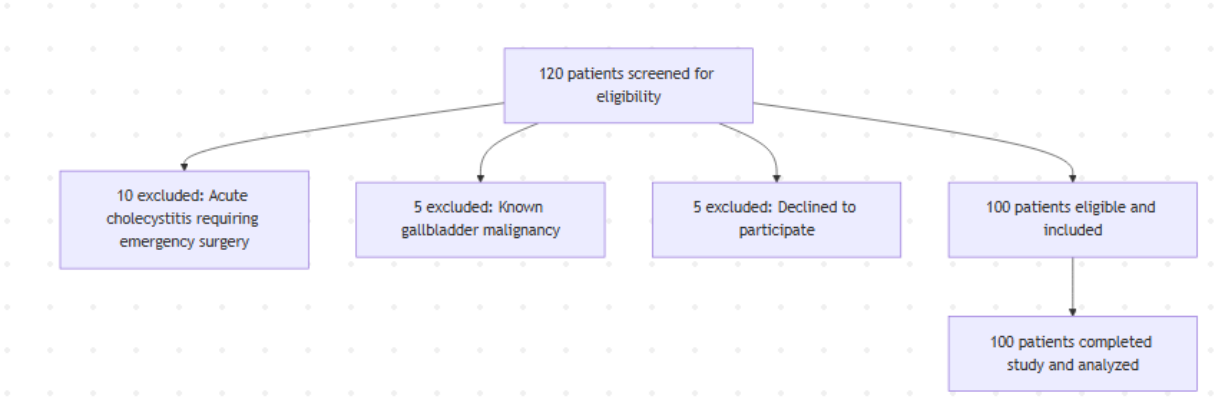

Table 1: Demographic Characteristics and Conversion Rate

Demographic Variable	Total (n=100)	Conversion (n=18)	Non-Conversion (n=82)	p-value
Age > 50 years	40	12 (30%)	28 (70%)	0.015*
Male	35	10 (28.6%)	25 (71.4%)	0.042*

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1834
Original Article

BMI > 30	22	9 (40.9%)	13 (59.1%)	0.006*

Older age (>50 years), male gender, and obesity (BMI > 30) were significantly associated with higher conversion rates. Patients above 50 years had a conversion rate of 30%, while Obese patients had the highest conversion rate (40.9%), indicating these as potential predictors of technical difficulty during laparoscopic surgery.

Table 2: Clinical History and Conversion Rate

Clinical Variable	Total (n=100)	Conversion (n=18)	Non-Conversion (n=82)	p-value
History of acute cholecystitis	36	10 (27.8%)	26 (72.2%)	0.021*
Previous abdominal surgery	20	6 (30%)	14 (70%)	0.037*
Duration of symptoms > 6 months	29	8 (27.6%)	21 (72.4%)	0.050*

A prior history of acute cholecystitis and previous abdominal surgeries were significantly associated with conversion. These factors may contribute to dense adhesions or anatomical distortion, making laparoscopic dissection more challenging. Prolonged symptom duration also showed a borderline significant association with conversion.

Table 3: Ultrasonographic Findings and Conversion Rate

USG Finding	Total (n=100)	Conversion (n=18)	Non-Conversion (n=82)	p-value
Gallbladder wall > 3 mm	30	11 (36.7%)	19 (63.3%)	0.003*
Pericholecystic fluid present	18	7 (38.9%)	11 (61.1%)	0.014*
Stone impacted in neck	25	8 (32%)	17 (68%)	0.019*

Thickened gallbladder wall, pericholecystic fluid, and impacted stone in the neck of the gallbladder were all statistically significant predictors of conversion. These findings are suggestive of chronic inflammation and difficult anatomy, which are common reasons for conversion.

Table 4: Intraoperative Factors and Conversion Rate

Intraoperative Finding	Total (n=100)	Conversion (n=18)	Non-Conversion (n=82)	p-value
Dense adhesions	28	12 (42.9%)	16 (57.1%)	<0.001*
Distorted Calot's triangle	20	10 (50%)	10 (50%)	<0.001*
Intraoperative bleeding	14	6 (42.9%)	8 (57.1%)	0.018*

Among intraoperative findings, dense adhesions and distorted Calot's triangle anatomy were the most significant factors leading to conversion. Intraoperative bleeding also had a significant impact. These factors make laparoscopic dissection unsafe or impossible, necessitating conversion for patient safety.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1834
Original Article

Table 5: Logistic Regression Analysis – Independent Predictors of Conversion

Variable	Odds Ratio (OR)	95% Confidence Interval	p-value
Age > 50	2.6	1.1 – 6.5	0.030*
BMI > 30	3.9	1.5 – 10.2	0.004*
Gallbladder wall > 3 mm	3.2	1.2 – 8.3	0.016*
Dense adhesions	5.4	2.1 – 13.8	<0.001*
Distorted Calot's triangle	6.1	2.3 – 16.0	<0.001*

Multivariate logistic regression analysis identified age over 50, obesity, gallbladder wall thickening, dense adhesions, and distorted anatomy as independent predictors of conversion. Distorted Calot's triangle anatomy had the highest odds ratio, indicating it as the strongest predictor among all variables.

Discussion

Comparison of Findings with Other Studies

This study aims to identify predictors of conversion to open cholecystectomy (OC) in laparoscopic (LC) patients. The research was done at RIMS, Ranchi's General Surgery Department. Our 18% conversion rate matches global statistics, which range from 2% to 20% based on surgeon experience, patient characteristics, and case complexity. [13] found 15% conversion rates and 19.5%, suggesting our findings are typical of tertiary care. This study shares demographic relationships like older age, male gender, and higher BMI with previous research. [14] reported that older patients and male patients were more likely to convert due to adhesions and difficult architecture. The finding of the study with 30% of patients were 50 and older supports [15] the finding that persistent inflammation associated with aging can increase fibrotic tissue, making laparoscopic surgery harder.

Interpretation of Significant Associations

The cohort had a 40.9% conversion rate for BMIs over 30. Obesity has historically been linked to lower conversion rates because of increased intra-abdominal fat, impaired eyesight, and surgical field access issues. This supports Mhaske et al.'s findings that obesity raises the risk of complications and lengthens surgery. The patient's medical history before surgery was also significant. Acute cholecystitis and abdominal surgeries significantly increased conversion rates. Adhesions and fibrotic tissue impair conventional anatomical landmarks. If you have undergone past surgery, especially on the upper abdomen, laparoscopic dissection can damage you because it changes tissue planes. The study's 30% conversion rate for patients who had abdominal surgery before shows the need for preoperative imaging and history-taking. On ultrasound, pericholecystic fluid impacted stones, and gallbladder wall thickness (>3 mm) were key indicators. Since sonographic signals of inflammation usually indicate chronic or severe disease, conversion may be necessary due to safety concerns or the difficulty of dissecting Calot's triangle. Calot's triangle anatomical deformity and severe adhesions were the biggest conversion signs on the operating table. These results usually require surgical conversion to prevent bile duct damage or hemorrhage. The study found that 42.9% of individuals with anatomical deformities or heavy adhesions needed conversion.

Implications

This study has administrative and therapeutic consequences. Before surgery, high-risk patients should be identified so that more experienced surgeons may be assigned, extra time can be provided, and patients can receive counseling. In high-risk scenarios, instrument and blood product availability optimises resource use. Administrators at high-volume government hospitals like RIMS value such data

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1834
Original Article

because it improves workflow and operating room time. Risk-stratification-based patient therapy prepares people psychologically for conversion. When conversion is needed, it helps align patients' expectations, which promotes satisfaction and reduces surgical anxiety.

Strengths of the Study

One of the main strengths of this study lies in its prospective cross-sectional design and standardized data collection method using a structured proforma. The study was conducted in a tertiary care center with uniform surgical protocols, enhancing internal validity. By examining a comprehensive set of demographics, clinical, sonographic, and intraoperative variables, the study provides a holistic understanding of factors that can contribute to conversion. In addition, the use of multivariate logistic regression analysis allowed us to identify independent predictors, minimizing the influence of confounding variables.

Conclusion

A cross-sectional study of elective gallstone surgery patients intended to discover factors that predict laparoscopic to open cholecystectomy conversion. The study was done at Ranchi's Rajendra Institute of Medical Sciences (RIMS). National and international publications agree with this study's 18% conversion rate. The findings emphasize the importance of identifying patient and disease-related characteristics that may increase laparoscopic operation complications and suggest an open technique shift. This study indicated that patient age above 50, elevated BMI, history of acute cholecystitis, gallbladder wall thickness on sonography, and extensive adhesions or distorted Calot's triangle architecture during surgery were strong predictors. Each of these criteria raised conversion probability statistically. Their identification emphasizes the need for rigorous preoperative examination and tailored surgical planning. When risk factors like bile duct injury or uncontrolled hemorrhage are present, the surgical team should be prepared for conversion and take intraoperative precautions. Adding these prognostic indications to treatment regimens improves surgical preparedness and patient counseling. This data can also help surgeons optimize operating room time and resources. This study suggests utilizing uniform scoring methods or predictive algorithms to assess conversion risk before surgery. Due to the study's small sample size and single-center strategy", more prospective multicenter studies are needed to validate and generalize these findings. Adding predictive technologies to laparoscopic cholecystectomy workflows may improve results, reduce stress, and increase safety.

Limitations

Despite its benefits, the study has downsides. First, a 100-patient sample is sufficient for exploratory analysis, but the results may not be generalizable. A larger sample size across multiple centers might improve external validity and statistical power. The second issue is that the research only included data from one institution, thus the results may solely reflect RIMS, Ranchi's practices, surgeons' talents, and patients' personalities. Finally, the study did not group patients by surgeon expertise. Since experienced doctors have lower conversion rates, this may be a complicated issue. Another problem was that surgeons may disagree on subjective intraoperative assessments such as distorted anatomy or thick adhesions. Future studies should use a more objective assessment method or video documentation to ensure uniformity. Finally, we collected conversion data but not long-term postoperative outcomes like cost, patient satisfaction, or hospital stay. These criteria are critical for assessing conversion's effects. This study reveals that certain factors before and during surgery considerably enhance the risk of switching from laparoscopic to open cholecystectomy. Understanding these characteristics can improve surgery planning, patient safety, and operating complications. Future studies should use a larger cohort and multicentric design to confirm and expand these findings.

Acknowledgment

The Author would like to thank all the staff members of RIMS Ranchi for their collective support For everything. The author would like to thank all the coauthors for giving support in writing collecting and proofreading this work.

Lists of abbreviations

LC- Laparoscopic cholecystectomy

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1834
Original Article

OC- Open Cholecystectomy

Source of Funding

The author received no finanacial add or funding for this research work.

Conflict of interest

The Author declares no conflict of interest.

Author Biography

Dr . Anil Kumar Kamal is working as an Associate Professor in the Department of General Surgery at RIMS Ranchi.

Dr. Deepak Kumar is working as a junior Resident in the Department of General Surgery at RIMS Ranchi

Dr. Samir Toppo is working as an Additional Professor in the Department of General Surgery at RIMS Ranchi.

Dr . Kumar Gaurav is working as an Associate Professor in the Department of General Surgery at RIMS Ranchi.

Dr. Kamlesh Kumar Is working as a senior Resident in the Department of General Surgery at RIMS Ranchi.

Dr. Krishan Kumar is working as a senior Resident in the Department of General Surgery at RIMS Ranchi

Dr. Archana is working as a senior Resident in the Department of Anaesthesiology at RIMS Ranchi

Dr. Ranjeet kumar rajak is working as a junior Resident in the Department of General Surgery at RIMS Ranchi.

Author Contribution

Dr. Deepak Kumar – Data collection, drafting and interpretation and finalising and final editing of this manuscript.

Dr . Anil Kumar Kamal– Drafting supervise and proofread of this manuscript.

Dr. Archana/Ranjeet Kumar Rajak/Samir Toppo/Kamlesh Kumar/Krishan Kumar-Finalize, conceptualized, briefings corrections and final editing this manuscript.

Reference

1. Ali, G., Zeb, M., Khattak, A., Khan, R., Dawar, M. K., Zaman, K., ... & Khan Sr, R. (2024). Frequency and Predictors of Conversion From Laparoscopic to Open Cholecystectomy: A Single-Center Observational Study. Cureus, 16(12). https://doi.org/10.7759/cureus.76327 PMid:39850183
2. Nouh, T., Alanazi, F., Abunayan, A. S., Alsaadoun, A. F., Alsehly, M. A., Almanie, M. A., ... & Altuwaijri, T. A. (2019). Factors affecting conversion from laparoscopic cholecystectomy to open cholecystectomy at a tertiary care facility in Saudi Arabia: a cross-sectional study. International Surgery, 104(3-4), 166-170. https://doi.org/10.9738/INTSURG-D-19-00025.1
3. Magnano San Lio, R., Barchitta, M., Maugeri, A., Quartarone, S., Basile, G., & Agodi, A. (2022). Preoperative risk factors for conversion from laparoscopic to open cholecystectomy: a systematic review and meta-analysis. International journal of environmental research and public health, 20(1), 408. https://doi.org/10.3390/ijerph20010408 PMid:36612732 PMCid:PMC9819914
4. Komar, M. H., & Imanuddin, K. A. (2024). Predicting Conversion to Open Cholecystectomy: A Validation Study of the Difficult Laparoscopic Cholecystectomy Scoring System. Bioscientia Medicina: Journal of Biomedicine and Translational Research, 8(12), 5593-5606. https://doi.org/10.37275/bsm.v8i12.1137
5. MD, T. (2018). Validation of a scoring system to predict difficult laparoscopic cholecystectomy: a one-year cross-sectional study. Journal of the West African College of Surgeons, 8(1), 23.
6. Bhandari, T. R., Khan, S. A., & Jha, J. L. (2021). Prediction of difficult laparoscopic cholecystectomy: An observational study. Annals of medicine and surgery, 72, 103060. https://doi.org/10.1016/j.amsu.2021.103060 PMid:34815866 PMCid:PMC8591467

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1834
Original Article

7. Ary Wibowo, A., Tri Joko Putra, O., Noor Helmi, Z., Poerwosusanta, H., Kelono Utomo, T., & Marwan Sikumbang, K. (2022). A Scoring System to Predict Difficult Laparoscopic Cholecystectomy: A Five-Year Cross-Sectional Study. Minimally Invasive Surgery, 2022(1), 3530568. https://doi.org/10.1155/2022/3530568 PMid:36110248 PMCid:PMC9470297
8. Baral, S., Thapa, N., Babel, S., Poudel, S., & Chhetri, R. K. (2024). Assessment of G10 intraoperative scoring system for conversion in patients undergoing laparoscopic cholecystectomy: a cross-sectional study from Nepal. Cureus, 16(3). https://doi.org/10.7759/cureus.55392 PMid:38562316 PMCid:PMC10984243
9. Nassar, A. H., Zanati, H. E., Ng, H. J., Khan, K. S., & Wood, C. (2022). Open conversion in laparoscopic cholecystectomy and bile duct exploration: subspecialisation safely reduces the conversion rates. Surgical endoscopy, 1-9. https://doi.org/10.1007/s00464-021-08316-1 PMid:33528666 PMCid:PMC8741693
10. Amer, S. B., Badawneh, L., Almemeh, L., Wasfi, G., AL-Omari, A. A. R., Abuzaid, L., ... & Abu-Aleigeh, S. (2024). Key Predictors of Intraoperative and Postoperative Complications in Laparoscopic Cholecystectomy: Insights from a Jordanian Cross-Sectional Study. medtigo Journal, 2(4). https://doi.org/10.63096/medtigo30622424
11. Harish Nandagopal, J., Janugade, H. B., & Katkar, A. (2023). Exploring Factors Influencing the Transition from Laparoscopic to Open Cholecystectomy. Azerbaijan Pharmaceutical and Pharmacotherapy Journal, 22, 15-17. https://doi.org/10.61336/appj/22-2-05
12. Mikwar, Z. A., Aljadani, F. F., Neazy, F. A., Alsaadi, N. H., Alzahrani, M. A., Alotaibi, A. K., & Awadh, A. (2024). The Conversion Rate of Laparoscopic Cholecystectomy to Open Cholecystectomy at KAMC-JEDDAH, Saudi Arabia: Prevalence and Causes. Saudi Arabia: Prevalence and Causes. https://doi.org/10.2139/ssrn.4714593 PMid:39050302 PMCid:PMC11267824
13. SUBHAN, S., & AKBAR, F. (2025). USE OF G10 SCORING SYSTEM TO PREDICT DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY AND CONVERSION TO OPEN CHOLECYSTECTOMY. Pakistan Journal of Intensive Care Medicine, 5(01), 53-53. https://doi.org/10.54112/pjicm.v5i01.53
14. Acharya, B., Dulal, S., Yadav, B., Aryal, S., Sarraf, S. K., Subedee, A., ... & Gole, S. L. (2024). Preoperative Prediction of Difficult Laparoscopic Cholecystectomy using Risk Score for Conversion from Laparoscopic to Open Cholecystectomy: An Observational Study. Journal of Institute of Medicine Nepal, 46(2), 43-48. https://doi.org/10.59779/jiomnepal.1295
15. Iftikhar, N., Naeem, M., Ansari, S. S., & Shaikh, A. R. (2023). Frequency of Conversion of Laparoscopic Cholecystectomy to Open Cholecystectomy in a Low-Middle-Income Country. J Community Med Public Health, 7(356), 2577-2228. https://doi.org/10.29011/2577-2228.100356

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1834
Original Article

 PUBLISHER DETAILS

Student's Journal of Health Research (SJHR)
(ISSN 2709-9997) Online
(ISSN 3006-1059) Print
Category: Non-Governmental & Non-profit Organization
Email: studentsjournal2020@gmail.com
WhatsApp: +256 775 434 261
Location: Scholar's Summit Nakigalala, P. O. Box 701432, Entebbe Uganda, East Africa