



PRE-OP ASSESSMENT ON THE BASIS OF CLINICAL, HEMATOLOGICAL, RADIOLOGICAL PARAMETERS FOR PREDICTION OF DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY

General Surgery

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ABSTRACT

Laparoscopic cholecystectomy can present significant challenges in certain cases during routine procedure. Identifying preoperative risk factors can aid in surgical planning and patient counseling. The objective of the study was to demonstrate the role of clinical, hematological and radiological influences in predicting problematic laparoscopic cholecystectomy. Patients presenting with symptomatic cholelithiasis analyzed by ultrasonography/MRCP of stomach were enrolled in this study. The study reported a mean age of 41.82 ± 7.65 yrs & mean BMI of 27.4 ± 5.13 kg/m², with 80% of patients being female. Difficult laparoscopic cholecystectomy (LC) was associated with clinical factors like age >50, male gender, acute cholecystitis history, and palpable GB, as well as radiological factors like >4mm GB wall thickness, pericholecystic fluid, and impacted stones. That remained an important relationship ($p < 0.001$) amid pre-operative trouble & postoperative results. Preoperative prediction of challenging laparoscopic cholecystectomy & need for open surgery can be determined by considering previous cholecystitis attacks, gall bladder wall thickness, pericholecystic collection presence, & existence of palpable gall bladder or stuck stones. Hence, accurate preoperative prediction of difficult LC is possible & can assist in selecting appropriate patients for the procedure and providing them with counseling.

KEYWORDS

Cholecystitis, Haematology, Laparoscopic cholecystectomy, Ultrasonography

INTRODUCTION

Laparoscopic cholecystectomy usually use as standard therapy for gallstone disease to eliminate the gallbladder.¹ An estimated one million additional instances of cholelithiasis occur annually in the United States, while nearly 20 million people have gallstones.² Gallstones are a common issue in developed nations, effecting 10 to 15% of adults worldwide. They have been known about since antiquity and have been discovered in Egyptian mummies. It has been estimated that between 2% and 9% of Indians suffer from gallstone disease.³ In North India, it occurs seven times more frequently than in South India.⁴

Cholecystectomy is the primary elective process on the biliary tract & the another most frequent abdominal surgery done nowadays.⁵ The first cholecystectomy was carried out in 1882 by German physician Carl Langebuch (1846–1901).⁶ However, some patients come with "difficult gallbladder" despite LC's proven safety and effectiveness. This phrase refers to a technically complex gallbladder condition that is brought on by fibrosis, anatomical changes, acute inflammation, adhesions, gallbladder empyema, gangrene, Mirizzi syndrome, and chronic inflammation.⁷ These disorders affect the choice of surgical method, make the procedure more difficult, and raise the risk of intraoperative complications.⁸ It was estimated that 16% of LC patients have "difficult gallbladder".⁹ Factors contributing to surgical complexity include dense adhesions around the gallbladder, a contracted or fibrotic gallbladder, and complex biliary anatomy. These conditions can pose significant technical challenges, even for experienced surgeons.^{10,11}

Numerous studies from many nations have highlighted the significance of characteristics that predispose patients to convert from laparoscopic to open cholecystectomy. Alteration to open process is more in age group > 65 years as shown in the study of Sanabria et al.¹³ Fried et al. found distended thickened gallbladder wall had higher rate of conversion.¹⁴ A study conducted by Simopoulos et al. examining 1,804 laparoscopic cholecystectomies from 1992 to 2004 reported a 5.2% conversion rate to open surgery. Conversions were more common in patients without inflammation (2.8%) compared to those with acute inflammation (18.4%). Factors associated with increased conversion risk included male sex, age over 60, prior abdominal surgery, diabetes, and inflammation severity. Patients with acute cholecystitis who underwent conversion had higher white blood cell counts, fever, and elevated liver enzymes compared to those without conversion.¹⁵ In 2007, Anand et al. analyzed conversion rates in 176

patients undergoing laparoscopic cholecystectomy for gallstones. The overall conversion rate was 11.93%, primarily due to dense adhesions (2.84%), postoperative adhesions (1.70%), uncontrollable bleeding from the liver or cystic artery (3.40%), unclear anatomy (1.14%), and other factors including bile duct injury, cirrhotic liver, stone spillage, and equipment failure.¹⁶

However, the many risk variables can be responsible to produce LC challenging. For both the patient and the surgeon, preoperative risk factors are crucial in predicting potential surgical complications. In patients with cholecystitis and cholelithiasis, this study sought to investigate clinical, hematological, and radiological markers that may predict a challenging laparoscopic cholecystectomy.¹²

BRD Medical College situated in indo-gangetic belt, where gall stone disease is more common as it serves as a referral institute for east UP and neighboring Asian countries like Nepal, Pakistan, and Bangladesh etc. On an average 2 patients per day undergo Laparoscopic cholecystectomy at the institute. In view of large number of patients undergoing laparoscopic cholecystectomy per year, this study will serve as an important tool in predicting preoperatively difficult cases for laparoscopic cholecystectomy, so that preoperatively proper counseling regarding conversion to open cholecystectomy and operative are well explained.

MATERIAL AND METHODS

Study Design And Sample Size

Following patient permission, this prospective study was carried out on 100 patients undergoing laparoscopic cholecystectomy at BRD Medical College's Nehru Hospital over the course of 12 months, from May 2023 to June 2024.

Inclusion Criteria

The patients presenting with symptomatic Cholelithiasis /cholecystitis & analyzed by ultrasonography/MRCP of abdomen.

Exclusion Criteria

- Bleeding diathesis
- Proven Carcinoma gall bladder
- Not fit for general anaesthesia
- Presence of jaundice
- Cholangitis
- Dilated common bile duct > 12 mm size

- Common bile duct stone

Study Procedure

Participants of all age groups, grades, gender, severity, education, and ethnic backgrounds diagnosed with Acne Vulgaris were included in the study. A thorough methodology was employed, commencing with the acquisition of an in-depth medical background from every individual. This was supported by a comprehensive clinical assessment and the execution of the required investigations, all of which were methodically arranged.

Data Analysis

The Statistical Package for Social Sciences (SPSS) version 23.0 for Windows was used to analyse all patient data after it had been previously entered into an Excel sheet. The arithmetic mean±standard deviation was used to display quantitative data. The chi-squared test and the T-test were employed in the parametric test. The two groups' category variables were compared using the chi-square test. P-values less than 0.05 were regarded as statistically significant.

RESULTS

The study focuses on understanding the influences that forecast problematic laparoscopic cholecystectomy (LC), a prevalent treatment for gallstone-related diseases. It emphasizes the rising prevalence of gallstones, particularly in North India, and the necessity of identifying predictors for surgical difficulty. Factors such as clinical symptoms, radiological findings (e.g., gallbladder wall thickness, stone size), and hematological parameters are examined to enhance preoperative planning and counseling. Data collected from patients at a high-volume center will help identify parameters influencing the alteration of LC to open surgery, thus optimizing outcomes. The research included total 100 patients; the mean age was reported as 41.82±7.65 years.

Table 1: Distribution Of Studied Patients Based On Intra-operative Parameters

Variables	No. of cases (n=100)	Percentage
Blood Loss in ml	<15	66 (66.0%)
	15-50	30 (30.0%)
	>50	4 (4.0%)
Time taken for surgery in min	<45	66 (66.0%)
	45-90	30 (30.0%)
	>90	4 (4.0%)
Cystic duct injury	21	21.0%
Cystic artery injury	19	19.0%
Conversion to open	7	7%
Bile spillage/stone spillage	20	20.0%

Blood loss during surgery varied, with 66 (66.0%) patients lasting <15ml, 30 (30.0%) patients lasting between 15-50ml, and only 4 (4.0%) patients exceeding 50 ml. Cystic artery injury occurred in 19 (19.0%) patients, & alteration to open surgery was necessary in 7 (7.0%) patients. Bile spillage/stone spillage in 20.0% of cases. Cystic artery injury was in 19.0% of cases. Figure 1 showing out of a total of 100 patients, 7 were converted to open while 93 cases were operated as laparotomy cholecystectomy.

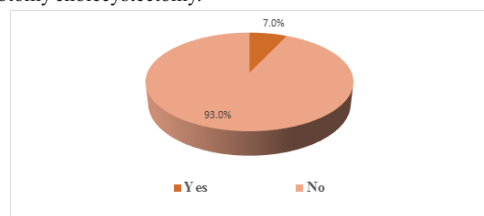


Figure-1: Incidence of converted to open surgery

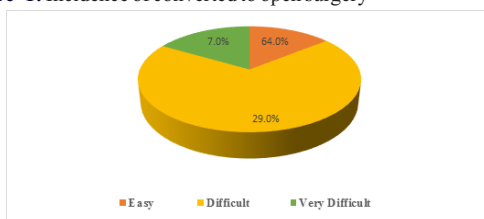


Figure-2 Distribution of studied patients based on surgical outcome

Figure 2 represents the majority of 64 (64.0%) patients were categorized as easy, 29 (29.0%) patients were classified as difficult and 7 (7.0%) patients were categorized as very difficult.

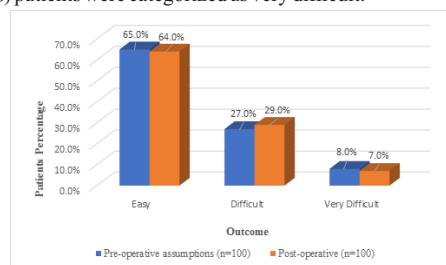


Figure -3 Comparison of pre-operative assumptions to post-operative outcome

Figure 3 showing the pre-operative predictions and post-operative surgical outcomes were found to be statistically non-significant ($p>0.05$).

Table 2: Pre-operative history, Clinical findings and risk of difficult cholecystectomy

Risk of difficult cholecystectomy		Easy (n=64)	Difficult (n=36)	p-value
Age in years	≤50	58 (90.6%)	26 (72.2%)	<0.001
	>50	6 (9.4%)	10 (27.8%)	
Gender	Female	46 (71.9%)	19 (52.8%)	0.006
	Male	18 (28.1%)	17 (47.2%)	
BMI (kg/m ²)	<25	19 (28.1%)	13 (36.1%)	0.147
	25-27.5	26 (40.6%)	9 (25.0%)	
	>27.5	19 (29.7%)	14 (38.9%)	
History of acute cholecystitis		2 (3.1%)	6 (16.7%)	<0.001
Abdominal scar		13 (20.3%)	11 (30.6%)	0.103
Palpable GB		6 (9.4%)	13 (36.1%)	<0.001

Table showing age, gender, history of acute cholecystitis, and palpable GB displayed a statistically important association with the risk of difficult cholecystectomy ($p<0.05$).

Table 3: Pre-operative, USG findings and risk of difficult cholecystectomy

Risk of difficult cholecystectomy		Easy (n=64)	Difficult (n=36)	p-value
Pericholecystic collection	Yes	53 (82.8%)	23 (63.9%)	<0.001
	No	11 (17.2%)	13 (36.1%)	
Impacted stone in the neck of GB	Yes	0 (0.0%)	11 (30.6%)	<0.001
	No	64 (100.0%)	25 (69.4%)	
Gall Bladder wall Thickness	<4mm	60 (93.8%)	25 (69.4%)	<0.001
	≥4mm	4 (6.2%)	11 (30.6%)	

The presence of an stuck pebble in the collar of GB, and Pericholecystic collection and gall bladder thickness showed a statistically important association with the risk of difficult cholecystectomy ($p<0.05$).

Table 4: Correlation Of Preoperative Score And The Outcome

Surgical outcome		Post-operative			Total
		Easy	Difficult	Very Difficult	
Pre-operative	Easy (0-5)	64 (100.0%)	1 (3.4%)	0 (0.0%)	65 (65.0%)
	Difficult (6-10)	0 (0.0%)	27 (93.1%)	0 (0.0%)	27 (27.0%)
	Very Difficult (11-15)	0 (0.0%)	1 (3.4%)	7 (100.0%)	8 (8.0%)
Total		64 (100.0%)	29 (100.0%)	7 (100.0%)	100 (100.0%)
p-value		<0.001			

The relationship between pre-operative and post-operative surgical outcomes was observed and it was found that the difficulty level of the pre-operative condition strongly predicts the postoperative outcome and the $p<0.001$, representing a statistically important association amid pre-operative & post-operative outcomes.

DISCUSSION

Laparoscopic cholecystectomy is crucial for optimizing surgical planning. Identifying high-risk cases allows for the involvement of experienced surgeons, reducing operative time and complications. While numerous scoring systems have been proposed, their complexity often hinders practical application.^{17,18,19}

In order to advise the high-risk patient on the likelihood of conversion prior to surgery and to better prepare them for the intraoperative difficulties, it is crucial to understand the factors that predict difficulty during laparoscopic cholecystectomy. Therefore, we aimed to study the preoperative clinic, hematological and radiological factors in forecasting assessing trouble level of LC, Jina et al. carried out a prospective investigation to evaluate clinical, hematological, and radiological influences in forecasting problematic LC at a tertiary medical facility. They found that factors such as age, gender, obesity, previous upper abdominal surgery, elevated TLC and ALP levels, presence of numerous pebbles, & constricted gall bladder are important risk factors for laparoscopic cholecystectomy & serve as forecasters for alteration to open cholecystectomy.²⁰ Mishra et al. carried out an observational cross-sectional study of the pre-operative prognostic features for problematic LC at tertiary care centre & found that a preoperative grading system can be used to predict the likelihood of a difficult laparoscopic cholecystectomy and conversion to open surgery.²¹

CONCLUSION

Preoperative prediction of challenging LC & alteration to open surgery can be determined by considering the amount of prior cholecystitis attacks, thickness of gall bladder wall, & if pericholecystic assortment, palpable gall bladder, or stuck pebbles are present. Hence, it is possible to accurately predict difficult LC before surgery, aiding in selecting appropriate patients and providing necessary counseling. One of the most secure surgical techniques is laparoscopic cholecystectomy. In addition to saving time and money, improved preparation can improve the patient-surgeon relationship in the event of problems and conversion to open surgery.

Future Scope

Future research should continue to refine these treatment protocols, focusing on forecasting problematic LC & alteration to open cholecystectomy. By aligning treatment strategies with patient-specific factors, healthcare providers can improve overall outcomes & value of life for patients undergoing LC. A multicentre trial with a larger patient sample would be needed to address the limitations. A further long term, large-scale multicentre follow-up study is required. Furthermore, a study on the treatment of laparoscopic cholecystectomy associated with other gall bladder diseases is required.

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