

Preoperative Predictors of Difficulty Laparoscopic Cholecystectomy: A Retrospective Single Center Study

Lochan Thanigachalam¹, Vinayagam Ganesan²

¹Post Graduate, Department of General Surgery, Sri Venkateshwaraa Medical College Hospital and Research Centre, Puducherry, India

²Associate Professor, Department of General Surgery, Sri Venkateshwaraa Medical College Hospital and Research Centre, Puducherry, India

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Corresponding author: Dr. Vinayagam Ganesan

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Abstract:

Background: Laparoscopic cholecystectomy (LC) is a gold standard treatment of symptomatic gallstone disease. Meanwhile, it is also a challenging procedure demanding excellent expertise for the best outcomes. Many times, difficult laparoscopic cholecystectomy is a nerve-wracking situation for surgeons. It endangers patients by causing potential injury to vital structures.

Objective: This hospital-based retrospective study aimed to find the diagnostic validity of preoperative parameters to predict the difficult laparoscopic cholecystectomy.

Materials and Methods: A total number of 54 patients admitted in surgery ward for laparoscopic cholecystectomy and within whom the diagnosis of cholelithiasis established between January 2023 to June 2023 were included in this study. Inclusion criteria included patient presenting with or without acute cholecystitis or chronic cholecystitis with cholelithiasis planned for laparoscopic cholecystectomy, patient aged more than 18yrs of age and patients giving written informed consent to participate in the study. Exclusion criteria included patient with CBD Calculi, Dilated CBD, cholangitis, patient with symptoms with obstructive jaundice, patient with known Carcinoma of the gall bladder, patient not willing for laparoscopic cholecystectomy or having absolute contraindication for laparoscopic surgeries and patient's refusal to participate in the study. Hospital records of these patients were retrieved from the MRD and data's like biodata, history, clinical examination findings, preoperative investigations, operative records and post-operative follow up were collected, then we analyzed clinical and ultrasound findings of all patients. A preoperative score was calculated to each patient before surgery by the following predictors given below and categorized the difficulties. All the experimental procedures and protocols used in this study were approved by the Ethical Clearance Committee. The data was collected, coded and recorded on Microsoft Excel Spreadsheet program and descriptive statistical analysis was performed.

Result: Among 54 patients, age below 50 years were 34 and above 50 years were 20, 40 were female and 14 were males and 30 were previously admitted.

Conclusion: Gender (male), past history of acute cholecystitis, gall bladder wall thickness ($\geq 4-5$ mm), fibrotic gallbladder, and adhesion in the triangle of Calot were significant risk factors for difficult LC.

Keywords: Cholelithiasis, Predictors, Difficult laparoscopic cholecystectomy.

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Introduction

Laparoscopic cholecystectomy since its first description in 1985 has become the reference standard for the treatment of benign biliary disease. Nowadays it is one of the most frequently performed surgical procedures in the world.[1] At the beginning of the development of the laparoscopic technique, there was a high rate of bile duct injuries and complications due to the learning curve, with time, serious lesions decreased from 0.08 to 0.12% and 1.5% of all lesions.[2] The difficulty of cholecystectomy has been related to complications.[3] Multiple factors that may

influence the difficulty of a cholecystectomy have been described, which may be related to the patient, such as age, sex, anatomical variations, previous surgeries, obesity, or may be related to pathologies such as severe inflammation or impacted stones, external factors such as failure of inappropriate equipment or equipment may also influence.[4] The evaluation of this difficulty can also vary between the perception of a surgeon and another, hence the importance of using a single intraoperative difficulty scale, where intraoperative findings are described.[5] To use one of these

scales, it must be based on intraoperative findings and thus define the difficulty of laparoscopic cholecystectomy, which, regardless of the surgeon, will not change. Given the above, multiple scales such as Parkland, AAST, Cuschieri or Sugrue have been described.[6]

Intraoperative findings are standardized with the help of one of these scales.[7] The difficulty of the procedure can vary between one and the other, the key is to predict this difficulty. In the literature, we find multiple scales to predict a difficult cholecystectomy; however, most of these are based on the conversion rate or the surgical times, which can vary according to the experience of the surgeon.[8] Therefore, these scales cannot be universally used.[9] The important thing about using the scales that predict the difficulty of cholecystectomy is that with this information we can choose the surgeon of the case, the schedule in which it is performed, optimize the pre-surgical planning and have an adequate informed consent for each patient to improve the outcomes.[10]

In view of the above, we sought to find the diagnostic validity of preoperative parameters to predict the difficult laparoscopic cholecystectomy.

Method

A total number of 54 patients admitted in surgery ward for laparoscopic cholecystectomy and within whom the diagnosis of cholelithiasis established between January 2023 to June 2023 were included in this study.

Inclusion criteria included patient presenting with or without acute cholecystitis or chronic cholecystitis with cholelithiasis planned for laparoscopic cholecystectomy, patient aged more than 18yrs of age and patients giving written informed consent to participate in the study. Exclusion criteria included patient with CBD Calculi, Dilated CBD, cholangitis, patient with symptoms with obstructive jaundice, patient with known Carcinoma of the gall bladder, patient not willing for laparoscopic cholecystectomy or having absolute contraindication for laparoscopic surgeries and patient's refusal to participate in the study.

Hospital records of these patients were retrieved from the MRD and data's like biodata, history, clinical examination findings, preoperative investigations, operative records and post-operative follow up were collected, then we analyzed clinical and ultrasound findings of all patients. A preoperative score was calculated to each patient before surgery by the following predictors given below and categorized the difficulties, Table 1.

Table 1: Patient Score

Scoring Factor	Minimum Score		Maximum Score		Total
	Variable	Score	Variable	Score	
Clinical					
Age	<50	0	>50	1	1
Sex	F	0	M	1	1
History of the Previous Hospitalization	No	0	M	1	1
BMI	<25	0	>27.5	2	2
Abdominal Scar	No	0	Yes	1	1
Palpable Gall Bladder	No	0	Yes	1	1
Haematological					
TLC	<11000	0	>11000	1	1
USG					
Gall bladder wall thickness	<4 mm	0	>4 mm	2	2
Gall bladder adhesions	No	0	Yes	1	1
Pericholecystic fluid collection	No	0	Yes	1	1
Impacted Stone	No	0	Yes	1	1
Total Maximum Score =15					
Difficulty					Score
Easy					0-5
Difficult					6-10
Very Difficult					11-15
Difficulty Level					Criteria
Easy					<input type="checkbox"/> Operative Time <60 min <input type="checkbox"/> No bile spillage <input type="checkbox"/> No injury to duct or artery
Difficult					<input type="checkbox"/> Operative Time 60-120 min <input type="checkbox"/> Bile or stone spillage <input type="checkbox"/> Injury to duct or artery

	<input type="checkbox"/> No conversation to open
Very difficult	<input type="checkbox"/> Operative Time >120 min
	<input type="checkbox"/> Conversion to OC

This study analyzed various intraoperative difficulties based on operating time, adhesions in Calot's triangle, bile spillage, injury to cystic duct/artery, conversion to open surgery. Then this study correlated the difficulties with scoring factors and evaluated the efficacy of scoring factors.

Statistical Analysis

The data was collected, coded and recorded on Microsoft Excel Spreadsheet program and descriptive statistical analysis was performed. Data analysis was performed using Statistical Package

for the Social Sciences (SPSS) software (version 24). Statistical significance was kept at $p < 0.001$.

Results

Study variables

Table 2: Tabulation of study variables

Category	Easy	Difficult	Very difficult
Number of patients (n, %)	45 (83.3)	5 (9.2)	4 (7.4)
Age			
<50 years	31	2	1
≥50 years	14	3	3
Gender			
Male	8	3	3
Female	37	2	1
Previous Hospitalizations			
Yes	26	1	3
No	19	4	1
BMI			
<25	30	1	0
25 to 27.5	10	1	1
≥27.5	5	3	3
Abdominal Scar			
No scar	30	0	0
Infra umbilical scar	15	2	2
Supra umbilical scar	0	3	2
Palpable gall bladder			
Yes	10	4	2
No	35	1	2
TLC values			
4000 to 11000	30	1	1
>11000	15	4	3
Gall bladder wall thickness			
<4 mm	40	2	1
≥ 4mm	5	3	3
Pericholecystic collection			
Yes	3	4	3
No	42	1	1
Impacted Stone			
Yes	2	3	3
No	43	2	1

In our study 54 patients were included, intraoperative outcome of 54 patients were categorized into easy, difficult, very difficult and were recorded in above Table 2. Among 54 patients, Age below 50 years were 34 and above 50 years were 20. When age progress >50yrs there is increase in conversion due to higher likelihood of complicated biliary tract disease, which gets

superimposed by various co morbidities. Among 54 patients 40 were female and 14 were males. Males have an increased risk in conversion due to delayed presentation of symptoms compared to females. The possible reason could be less attention to mild symptoms leading to presentation only after disease presentation. Among 54 patients, 30 were previously admitted. Previous history of

hospitalization due to acute attack of cholecystitis, increases the gall bladder wall thickness and gall bladder becomes scarred and fibrosed, further increases the adhesion in the calot's triangle and between the gall bladder and fossa. Based on BMI and abdominal scar location, the intraoperative outcome of 54 patients were recorded in above Table 2. Obese patients (BMI ≥ 27.5) having more fat deposition in anterior abdomen wall and gastrointestinal organs leads to difficulty in dissection of gall bladder and exploration of CBD and making the laparoscopy difficult. Previous upper abdominal surgical scar increases the difficulty, may be chances of adhesions between the viscera or omentum and abdominal wall, difficulty in creation of pneumoperitoneum and insertion of first port.

Discussion

Over the past few decades, the benefit of laparoscopic cholecystectomy over open surgery has been extensively accepted.[11] However, many times it is challenging and the surgeon has to face the difficulty that might lead to injury to adjacent structures leading to an increase in morbidity.[12] Therefore, the preoperative estimate of a difficult LC is essential to predict the difficulty as well as for a better surgical plan. It also helps the surgeon in being better prepared to anticipate the intraoperative difficulties.[13]

When we analyzed the predictors of difficult LC in DLC, we found that gender (male), past history of acute cholecystitis, gall bladder wall thickness ($\geq 4-5$ mm), fibrotic gallbladder, and adhesion in the triangle of Calot were significant risk factors for difficult LC likewise reported in other studies.14-16

In our study, we found that there was delayed presentation of symptoms by male as compared to female patients. The possible reason could be less attention to mild symptoms leading to presentation only after disease progression.17 This scenario has also been mentioned in other studies. Likewise, the elderly population (age >60 years) has been defined as a predictor for difficult laparoscopic cholecystectomy in some studies.[15,16,17]

Patients who required hospitalization for repeated attacks of acute cholecystitis carry more chances of difficult laparoscopic cholecystectomy and conversion.18 Possibilities are dense adhesions at Calot's triangle and gall bladder fossa.[19] In our study also, it was found to be a significant factor for the prediction of difficult laparoscopic cholecystectomy. These cases required more time for dissection of Calot's triangle and dissection of the gall bladder from the liver bed.[20]

The small number of patients and single-center nature of this study are the major limitations. In

addition, this is a retrospective, non-comparative study, and does not include remote follow-up data. Hence, to endorse our findings, we recommend conducting appropriately designed prospective studies in our setting in the future.

Conclusion

Among the total 54 patients enrolled in present study, preoperative scoring system was able to correctly predict 52 cases (96.3% accuracy). Remaining 2 cases there was adhesions in calot's triangle and made to convert to open cholecystectomy. The difficult laparoscopic cholecystectomy and conversion to open surgery can be predicted preoperatively based on clinical, hematological and radiological findings. With the help of preoperative predictors, we could be able to classify the patients was easy to very difficult, thereby counselling the patient and their attenders regarding intraoperative blood loss, possible injuries to surrounding structures, chance of conversion to open cholecystectomy. By this we could be prepared for the intraoperative difficulties by the optimizing the patient's general condition, well equipped operation theater facilities and to seek expertise help.

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