



Pre-Operative Prediction of Difficult Laparoscopic Cholecystectomy That Requires Conversion to Open Procedure by Clinical and Ultrasonographic Parameters

S. Mohasina Samreen, K. Govardhaanan

¹Post Graduate Student, Department of General Surgery, Meenakshi Medical College, Hospital and Research Institute, Kanchipuram

²Professor, Department, Department of General Surgery, Meenakshi Medical College, Hospital and Research Institute, Kanchipuram

(Received: 07 January 2024

Revised: 12 February 2024

Accepted: 06 March 2024)

KEYWORDS

Difficult
Laparoscopic
Cholecystectomy,
Pre-Operative
Prediction,
Clinical
Parameters,
Biochemical
Parameters

ABSTRACT:

Aim: Utilising clinical, biochemical, and ultrasonographic characteristics, one can preoperatively forecast difficult laparoscopic cholecystectomy cases. One can also assess these indicators as predictors and determine conversion rates. Supplies and

Procedures- The present research covered the indoor laparoscopic cholecystectomy patients that were admitted. When the sample group was included in the research, they were informed and asked for their agreement.

Results: A number of biochemical, ultrasonographic, and clinical characteristics were statistically significant predictors of challenging laparoscopic cholecystectomy procedures. These measures can help identify situations in which the patient should get prior counselling and an open cholecystectomy should be performed.

Conclusion: Based on this research, we can say that preoperative clinical, biochemical, and ultrasonographic data should be employed as a means of screening because they are generally good indicators of the difficulties of a laparoscopic cholecystectomy. It can assist surgeons in gaining an understanding of the possible challenges that may arise with a specific patient

Introduction

In the West, laparoscopic cholecystectomy is a frequently done procedure that has a low death and morbidity rate. According to reports, between 1.8 to 27.7% of laparoscopic cholecystectomies end up requiring open surgery.^{1,2} Converted cases have a greater 30-day readmission rate, a higher risk of further treatments, and a larger number of infections and other postoperative problems. In general, patients who convert from laparoscopic to open surgery have longer lengthier recovery periods, greater rates of morbidity, and more fatalities.³

More complex cases that were deemed relatively contraindicated a few years ago are now being treated laparoscopically as more and more efforts are being

made in the field of laparoscopy. But, in order to prevent any catastrophic complications, extreme caution should be taken while dealing with severe gallstone disease. The secret to an effective laparoscopic cholecystectomy is safe dissection. Until a case is effectively resolved, it ought to constantly be seen as challenging. Depending on the surgeon's training and expertise, the degree of difficulty may change. Conditions including intra-abdominal adhesions, severely inflamed friable gall bladder, gangrenous gall bladder, and fibrotic Calot's triangle may be too challenging for a novice surgeon just starting out on their surgical career. Nevertheless, regardless of the surgeon's knowledge and skill, some disorders are extremely challenging to treat. Despite growing proficiency and technological advancements,



some centres still have a 1.5–35% conversion rate. This conversion is an attempt to prevent complications rather than a failure or a complication. When safe completion of the laparoscopic treatment cannot be guaranteed, an open cholecystectomy must be converted. Finding the factors that indicate a difficult laparoscopic cholecystectomy would be helpful in improving preoperative patient counselling, perioperative planning, and operating room efficiency. It could additionally assist in avoiding the costs and challenges related to laparoscopic procedures by carrying out open procedures when necessary.

Methodology

The Descriptive prospective cross-sectional study was conducted in the Department of General Surgery, Meenakshi Medical College, Hospital and Research Institute, Kanchipuram from December 2021 to October 2023 on all patients of who were admitted in surgery ward for laparoscopic cholecystectomy. The study was conducted after approval from Ethical committee. Written informed consent was obtained from each participant. The clinical details of the patients were recorded according to the Proforma and questionnaire form were prepared before the commencement of the study. All patients with symptomatic gall stone disease admitted for laparoscopic cholecystectomy. Patients with

common bile duct stone, with known carcinoma GB, Acute cholecystitis more than 72 hours, with history of cholangitis, combined with other surgeries, ASA score III/IV, Instrument failure and with Per-op/pre-diagnosed case finding of Mirizzi's Syndrome were excluded from study. At the same time. In our study, the Intraoperative findings which suggested Difficult laparoscopic Cholecystectomy Cases were:

- Total duration of surgery : >120 mins
- Total time taken to dissect calot's triangle : > 15 mins
- Total time taken dissect gall bladder from the gall bladder bed : >15 mins
- Tear of gall bladder and spillage of bile
- Conversion to open cholecystectomy

The percentage (%) and numerical forms were used to display the categorical variables. Conversely, the quantitative information were displayed as medians with 25th and 75th percentiles (interquartile range) and means \pm SD. The outcomes were subjected to the following statistical tests: The Statistical Package for Social Sciences (SPSS) software 23 was used for the final analysis after the data was entered into a Microsoft Excel spreadsheet. A p-value of less than 0.05 was deemed statistically significant in terms of significance.

Results

Table 1:-Distribution of clinical parameters of study subjects.

Clinical parameters	Frequency	Percentage
Age(years)		
21-30	41	16.40%
31-40	76	30.40%
41-50	79	31.60%
51-60	44	17.60%
>60	10	4.00%
Mean \pm SD	42.2 \pm 10.7	
Median (25th-75th percentile)		42(34-50)
Range		21-72
No chronic illness	248	99.20%
Hypertension	2	0.80%
Hypothyroid	1	0.40%
Presently acute attack	20	8.00%



History of upper abdominal surgery	2	0.80%
Gender		
Female	165	66.00%
Male	85	34.00%
Number of acute attacks		
0	96	38.40%
1	129	51.60%
2	16	6.40%
3	6	2.40%
4	2	0.80%
5	1	0.40%
Mean ± SD	0.77 ± 0.8	
Median(25th-75th percentile)	1(0-1)	
Range	0-5	

Figure 1:-Distribution of prediction by clinical parameters of study subjects

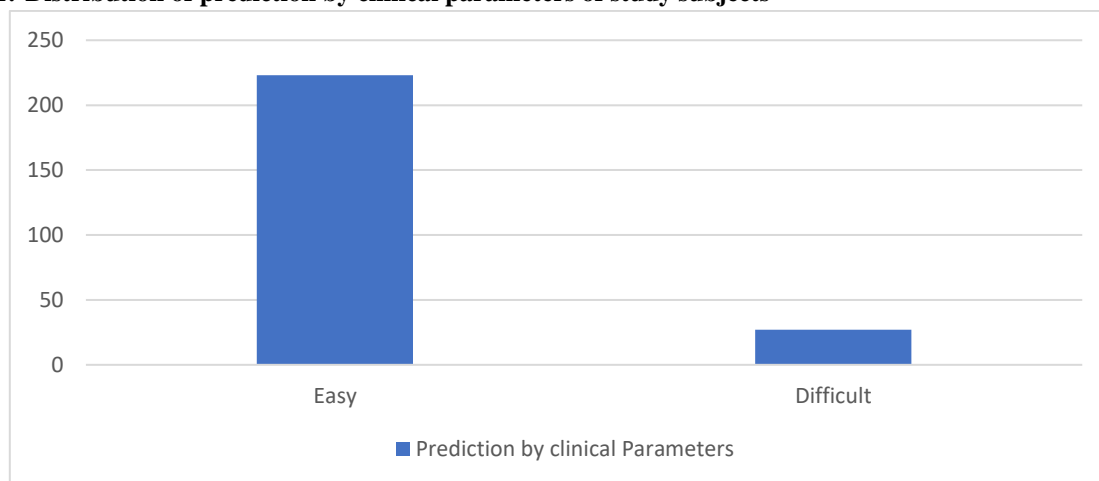


Table 2:-Association of clinical parameters with easy/difficult lap chole

Clinical Parameters	Easy(n=227)	Difficult(n=23)	Total	P value
Age(years)				
<=58	217 (93.94%)	14 (6.06%)	231 (100%)	<.0001 [†]
>58	10 (52.63%)	9 (47.37%)	19 (100%)	
No chronic illness				
No	0 (0%)	2 (100%)	2 (100%)	0.008*
Yes	227 (91.53%)	21 (8.47%)	248 (100%)	
Hypertension				
No	227 (91.53%)	21 (8.47%)	248 (100%)	0.008*
Yes	0 (0%)	2 (100%)	2 (100%)	
Hypothyroid				



No	227 (91.16%)	22 (8.84%)	249 (100%)	0.092*
Yes	0 (0%)	1 (100%)	1 (100%)	
Gender				
Female	152 (91.52%)	14 (8.48%)	165 (100%)	0.314†
Male	75 (88.24%)	10 (11.76%)	85 (100%)	
Presently acute attack				
No	221 (96.09%)	9 (3.91%)	230 (100%)	<.0001†
Yes	6 (30%)	14 (70%)	20 (100%)	
Number of acute attacks				
<=1	223 (99.11%)	2 (0.89%)	225 (100%)	<.0001*
>1	4 (16%)	21 (84%)	25 (100%)	
History of upper abdominal surgery				
No	226 (91.13%)	22 (8.87%)	248 (100%)	0.176*
Yes	1 (50%)	1 (50%)	2 (100%)	

Figure 2:- Receiver operating characteristic curve of age for predicting difficult lap chole

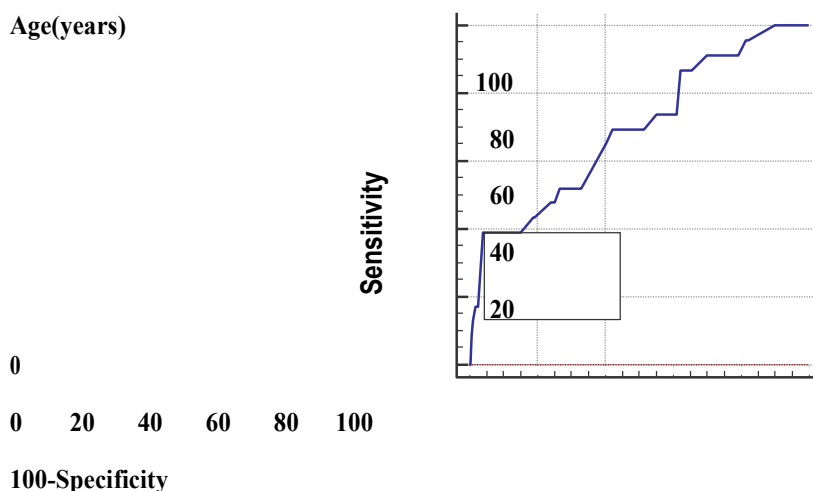


Table 3:-Association of prediction by clinical parameters with easy/difficult lap chole

Prediction by clinical parameters	Easy(n=227)	Difficult(n=23)	Total	P value
Easy	220 (98.65%)	3 (1.35%)	223 (100%)	<.0001*
Difficult	7 (25.93%)	20 (74.07%)	27 (100%)	
Total	227 (90.80%)	23 (9.20%)	250 (100%)	

Table 4:- Association of prediction by biochemical parameters with easy/difficult lap chole.

Prediction by biochemical parameters	Easy(n=227)	Difficult(n=23)	Total	P value
--------------------------------------	-------------	-----------------	-------	---------



	226 (96.17%)	9 (3.83%)	235 (100%)	<.0001*
Difficult	1 (6.67%)	14 (93.33%)	15 (100%)	
Total	227 (90.80%)	23 (9.20%)	250 (100%)	

Table 5- Distribution of USG findings of study subjects

USG findings	Frequency	Percentage
Pericholecystic collection	5	2.00%
Stone at neck/ cystic duct	9	3.60%
Mirrizi's syndrome	0	0.00%
GB contracted	9	3.60%
GB wall thickness (mm)		
Mean ± SD		2.38 ± 0.7
Median(25th-75th percentile)		2.2(1.9-2.6)
Range		1.2-4.8

Table 6:-Association of operative findings with easy/difficult lap chole.

Operative Findings	Easy	Difficult	Total	P value
Operative time (minutes)				
<=110	227 (99.56%)	1 (0.44%)	228 (100%)	<.0001*
>110	0 (0%)	22 (100%)	22 (100%)	
Calot's dissection time(minutes)				
<=16	226 (99.56%)	1 (0.44%)	227 (100%)	<.0001*
>16	1 (5.26%)	18 (94.74%)	19 (100%)	
Gb dissection time(minutes)				
<=15	227 (99.56%)	1 (0.44%)	228 (100%)	<.0001*
>15	0 (0%)	18 (100%)	18 (100%)	

Discussion

The current gold standard for treating symptomatic gallstone disease is laparoscopic cholecystectomy. It is also one of the most often carried out procedures in the GSVM Medical College and the LLR Associated Hospital. The primary goal of the research is to investigate, utilising clinical, biochemical, and ultrasonographic characteristics, the pre-operative prognostic factors for challenging laparoscopic cholecystectomy procedures. The research's particular goals are to assess these factors and determine the conversion rate. Performing a laparoscopic cholecystectomy in patients with extensive adhesions and deformed anatomy might be challenging.

Attachments in the Calot's triangle or frozen calot's, distorted anatomy, history of multiple acute attacks, thick-walled or acquired gallbladder, Mirizzi's syndrome, impaction of stone at the neck/cystic duct, prior upper abdominal surgery, and acute cholecystitis are some of the features that can increase the technical difficulty.^{4,5} The range of conversion rates observed in different research is 1.5 to 35%.

Age, sex, number of prior acute attacks, history of upper abdominal surgery, elevated bilirubin and ALP, elevated white blood cell count, gallbladder wall thickness, gallbladder volume, and number of stones, common bile duct size, and stone impaction in the neck are among the preoperative parameters that have been identified in the



literature as predictive factors for a challenging laparoscopic cholecystectomy. Age above 65, male sex, prior upper abdominal surgery, gallbladder wall thickness, constricted gallbladder, and stone impaction are the factors that have been shown to have the strongest link with challenging laparoscopic cholecystectomy and/or conversion of laparoscopic to open cholecystectomy in earlier research. Of the 250 instances in the present research, 23 cases—including converted cases—were problematic (9.2%). Out of 23, 4 cases got converted to open cholecystectomy with conversion rate of 1.6%. This conversion rate is less in comparison to several other studies.^{6,7}

The patients ranged in age from 21 to 72 years old. The age range of 41 to 50 years old comprised the majority of the patients. The standard deviation was 10.7 years, while the mean age was 42.2 years. Using the ROC curve, an age threshold of 58 years was established based on our age. It has been noted that the likelihood of a challenging laparoscopic cholecystectomy rises with age. The observed discrepancy might result from the research's small sample size of individuals older than 65. Age above 65 was revealed to be a significant independent predictor factor for conversion on multivariate logistic regression analysis by H. J. J. van der Steeg et al. (2011).⁸

Conclusion

The total operating time from trocar inserting to gallbladder extraction (more than 120 minutes), gallbladder tear with bile and stone spillage, Calot's dissection time >15 minutes, and time required to dissect the GB from the GB bed and convert to an open cholecystectomy were the operative parameters used to evaluate the difficulty of the laparoscopic cholecystectomy. Cutoffs recommended by the ROC curve could be utilised to create a system for scoring.

References

1. Fleisher LA, Roizen MF: Cholecystectomy, laparoscopic; in Fleisher LA, Roizen MF (eds): *Essence of Anesthesia Practise*. Saunders, Philadelphia, 1999, p 435.
2. Ainsworth AP, Adamsen S, Rosenberg J: Kolecystektomi I Danmark 1989-2003. *Ugeskr Laeger* 2005;167:2648-2650.
3. Keus F, de Jong JA, Gooszen HG, van Laarhoven CJ: Laparoscopic versus open cholecystectomy for patients with symptomatic cholelithiasis. *Cochrane Database Syst Rev* 2006;4:CD006231.
4. Cushieri A, Duboisf, Mouiel J, et al. The European experience with laparoscopic cholecystectomy. *Am J Surg* 1991; 161: 385-7
5. Davis C, Arrengani M, Nagan R, et al. Laparoscopic cholecystectomy: The St. Vincent experience. *Surg LaparoscEndosc* 1992; 2:64-9
6. Chang Mau Lo, Chi Leung, et al. Prospective randomized study of Early versus Delayed Laparoscopic cholecystectomy for acute cholecystitis. *Annals of Surgery* 1998; 227: 4: 461-467
7. Deitch EA, Utility and accuracy of ultrasonographically measured gallbladder wall as diagnostic criteria in biliarytract disease. *Dig Dis Sci* 1981;26: 868-93.
8. H. J. J. van der Steeg, S. Alexanderl, S. Houterman, G. D. Slooter, R. M. H. Roumen. Risk factors for conversion during laparoscopic cholecystectomy – experiences from a general teaching hospital: *Scandinavian Journal of Surgery* 100: 169–173, 2011.