A Clinico-Radiological Study to Determine the Predictive Factors for Difficult Laparoscopic Cholecystectomy

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Abstract
BACKGROUND*: Pre-operative prediction of a difficult laparoscopic cholecystectomy(LC) can help the patient as well as the surgeon to prepare better for the intra-operative risk of LC and to reduce the risk of conversion to open procedure.*
METHODS*: 65 patients who underwent LC from January 2017 to june 2018 in B S Medical College and Hospital, Bankura, were taken in this study group. For this study the pre-operative difficulty was predicted using scoring system, obtained from parameters like age, sex, BMI, severity of attack, h/o previous lower abdominal surgery and ultrasonography findings.*
RESULT: *most of the patients in this study were between 31-45 yrs of age and majority was female. Out of 65 patients, easy LC predicted on the basis of pre-operative variables were 44. Among them 9 patients predicted to have easy LC but found to be difficult. 18 patients were predicted to have difficult LC preoperatively. Among them 2 patients were found to had easy LC.This scoring system can predict difficult cases with 89% accuracy and easy cases with 80% accuracy.*
CONCLUSION*: Sex, BMI , severity of attack, gallbladder wall thickness are good predictive factors for preoperative assessment of difficult LC.*
Key Words: *Chronic calculous cholecystitis, laparoscopic cholecystectomy(LC), Gall Bladder(GB), BMI.*

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I. Introduction

Laparoscopic cholecystectomy is the gold-standard treatment for gall stone disease. The advantages of LC over open cholecystectomy are earlier return of bowel functions, less post-operative pain, lesser hospital stay, good cosmesis, earlier return to daily activity and overall decreased cost [1][2][3]. LC is associated with better preservation of immune function and a reduction of the inflammatory response as compared to open procedure. Chances of post-operative wound infection is lower.The rate of conversion from LC to open procedure is about 2-15% due to different reason[4][5] , hence it is necessary to study the predictive factors for difficult LC, therefore this study was undertaken.

II. Aims and objectives

Our aims were,
1)   To identify the clinico-radiological factors for predicting difficult LC preoperatively.
2)   To Select and counsel the patient regarding the difficulties of LC and regarding chance of conversion to open procedure preoperatively.

III. Materials and methods

The study was carried out in the Department of Surgery, Bankura Sammilani Medical , College , Bankura, West Bengal, India.
Study Design- Prospective, Observational.
Study Location: Department of Surgery, B S medical College, Bankura. This is a Tertiary Teaching Institute of West Bengal, India.
Study Duration: January, 2017 to June, 2018.
Sample Size- 65 Patients.
Sample Selection and Methods of Study: The patients who underwent LC in the study period were taken into consideration and also those patients who fulfill the following criteria:

INCLUSION CRITERIA:
•	All patients above 12 yr with ultrasonographically diagnosed chronic cholecytitis with or without cholelithiasis underwent LC in the above mentioned period.
EXCLUSION CRITERIA:
•	Pediatric cases <12 years
•	Ultrasonographically negative cases
•	Medically unfit cases.
•	Cases of carcinoma of gallbladder.
•	CBD stone with or without jaundice.
•	Acute cholecystitis with or without mucocele,empyema gangrene,biliary peritonitis.
•	Upper abdominal surgery.
•	Patients refusing surgery or refusing consent for LC.

Study technique:
A preoperative score was given to each patient on the basis of history, clinical examination, and sonographic finding as described in the scoring system (Table 1). Score up to 5 is defined as easy, 6-10 defined as difficult and 11- 14 defined as very difficult.

Table-1: PRE-OPERATIVE SCORING FACTORS FOR CHRONIC CHOLECYSTITIS CASES

HISTORY AND CLINICAL FINDINGS				MAX SCORE
AGE	<50(0)	>50(1)		1
SEX	FEMALE(0)	MALE(1)		1
SEVERITY OF ATTACK	MILD(1)	MODERATE(2)	SEVERE(3)	3
BMI	<25	25-27.5(1)	>27.5(2)	2
H/O PREVIOUS LOWER ABDOMINAL SURGERY	NO(0)	YES(1)		1
SONOGRAPHY				
GB WALL THICKNESS	NO(0)	YES(2) >3.5mm		2
SIZE OF STONE	<1CM(0)	>=1CM(1)		1
STONE IMPACTED AT NECK	NO(0)	YES(1)		1
NO. OF STONE IN GB	SINGLE(0)	MULTIPLE(1)		1
GB CONTRACTED	NO(0)	YES(1)		1

 All cases underwent LC by experienced surgeon were assessed for the following difficulties encountered, and with the help of this parameters LC has been categorized into easy, difficult and very difficult (Table-2).

1)	Time taken for surgery
2)	Bile/stone spillage
3)	Injury to duct or artery
4)	Conversion to open cholecystectomy

Table-2: CATEGORIZATION OF LC

Easy	Time taken > 60 min No bile spillage No injury to duct,artery
Difficult	Time taken 60-120 min Bile/stone spillage Injury to duct No conversion
Very difficult	Time taken >120 min Conversion to open procedure

All patient received same post op care and same antibiotic therapy. This study was approved by Institutional Ethical Committee .
Statistical Analysis:
All the data were filled in a printed format for further analysis by SPSS 23.0 Inc., IBM statistical system. Continuous normally distributed data were analyzed using Student's t-test. Proportions were compared by Chi-square test or Fischer exact test.

IV. Result and analysis

According to our study, the youngest patient was 18 years old and the oldest was 63 years old. Majority of patients were in the age group of 31-45 years(65%). Out of 65 patients in our study 44(68%) were female and 21(32%) were male. Among the 65 patients 35 patients have mild degree of attack,18 patients have moderate degree of attack and 12 patients have severe degree of acute attack. Among 65 patients 14 patients have positive history of LAS, while 49 patients have no history of LAS.We found that 19 patients had gallbladder wall thickened, 37 patients had multiple stones in gallbladder, 17 had stone size>1cm, 13 had stone impacted in GB neck, 14 had gallbladder contracted while 5 had calcified GB. Three patients had abnormal biliary tree. Out of 65 patients in which easy LC predicted on the basis of pre-operative variables are 44,out of them 35 found to be easy LC, rest 9 predicted to have easy LC but found to be difficult. 18 patients predicted to have difficult LC preoperatively are found to had 2 easy and 16difficult LC. Among 3 predicted to be very difficult, found to be 1 very difficult and 2 difficult. This scoring system can predict difficult cases with 94% accuracy and easy cases with 82% accuracy.

TABLE-3: CORRELATION OF PRE-OPERATIVE SCORE AND THE OUTCOME

PRE-OP SCORE	EASY	DIFFICULT	VERY DIFFICULT	TOTAL
0-5	35	9	0	44
6-10	2	16	0	18
11-14	0	2	1	3
TOTAL	37	27	1	65

Sex is also a predictor for outcome of LC. Easy cases are more common in females than male BMI is related to prediction of outcome of LC. Lower abdominal surgery is not found to be a significant predictive factor of outcome of LC. Most patients with cholelithiasis presented with mild to moderate degree of acute attack and severity of attack has significance association with laparoscopic cholecystectomy outcome. All 65 patients had stone in gallbladder, 19 had gallbladder wall thickened, and 17 had stone more than 1 cm in size.BMI > 25, severity of attack, gallbladder wall thickness are good predictive factors for difficult LC(Table-4).

Table-4:ANALYSIS OF OPERATIVE OUTCOME WITH THE RISK FACTORS

Parameter	Level	LC Outcomes Easy	Difficult	Chi Square	p-Value
AGE	<50	33	20	3.340	0.068
	>=50	4	8		
SEX	Female	8	13	4.485	0.034
	Male	29	15		
BMI	<=25	31	8	20.245	0.000
	>25	6	20		
PREVIOUS SURGERY(LAS)	Yes	7	7	0.349	0.555
	No	30	21		
SEVERITY OF ATTACK	Mild + moderate	34	19	6.116	0.013
	Severe	3	9		
SIZE OF STONE(USG)	<=1cm	30	18	2.328	0.127
	>1cm	7	10		
NO. OF STONE(USG)	Single	18	10	1.082	0.297
	Multiple	19	18		
GB WALL THICKNESS(USG)	Thin <3.5mm	30	16	4.415	0.036
	>= 3.5mm	7	12		
STONE IMPACTED AT NECK(USG)	Yes	5	8	2.259	0.133
	No	32	20		
CONTRACTED GB	Yes	6	8	1.440	0.230
	No	31	20		

V. Discussion

Most of the patients in this study group were in the age group of 31-45 years. Our study revealed no significant correlation between age and LC outcome. But other studies also supported the result of this study[6].

Among 65 patients, 44 (67%) were female and 21 were male. We found that sex had significant association with outcome of LC. Other studies regarding this also revealed same fact[6][7].

Most of the patients in this study were below 25 of BMI. In our study, we found significant correlation between BMI and difficult level of surgery. This positive relation may be shown in other studies also[8].

Out of 65 patients 35 patients had history of mild degree of acute attack, 18 had moderate degree of attack needing hospitalization and 12 had severe degree of attack, required prolonged duration of hospital stay. We have found positive co-relation with history of severity of attack and difficult LC. We also saw statistically significant relation between GB wall thickness and outcome of LC. But we do not found any statistically significant result between the parameters of number of stone, size of stone, contracted GB , impacted stone at neck and the outcome of LC. Lower abdominal surgery is not found to be a significant predictive factor of outcome of LC, it may be the fact that most LAS surgery in our series are tubectomy and no major lower abdominal surgery patients were in the part of the study. Also we do not consider clinically palpable GB and peri-cholecystic collection into account. But some other studies had taken this parameters into the consideration [6][9][10]. Some study also supported the statistical significant relation between GB wall thickness and outcome of LC[11][9]. But different other studies do not support the non significant result of impacted stone at GB neck with outcome of LC[6][9].

VI. Conclusion

In conclusion, Sex, BMI, severity of previous attack, GB wall thickness were found to be statistically significant in predicting difficult LC. This scoring system can predict difficult LC with higher accuracy than easy cases. Therefore, preoperative prediction of difficult LC is possible with high degree of accuracy and it could be used for proper patient selection for LC and proper patient counseling.

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