Original Research Article

A study of factors determining difficult surgery among patients undergoing laparoscopic cholecystectomy

**Mohhamad Sadik Akhtar[1], Parwez Alam[1]*, Yasir Alvi[2],
Syed Amjad Ali Rizvi[1], Mohhmad Habib Raza[1]**

[1]Department of Surgery, [2]Department of Community Medicine, JN Medical College, AMU, Aligarh, Uttar Pradesh, India

*Correspondence:
Dr. Parwez Alam,
E-mail: parwez786amu@gmail.com

ABSTRACT

Background: With widespread use of laparoscopic cholecystectomy and its applicability in many difficult situation, the chances of complication and difficulty during surgery have increased. This study was done to determine the factors which could preoperatively predict difficulty undergoing laparoscopic cholecystectomy.

Methods: The data were obtained from the patients admitted to in wards of General Surgery, JN Medical Collage, Aligarh Muslim University, and Aligarh, India undergoing laparoscopic cholecystectomy. The difficult laparoscopic cholecystectomy was defined as procedures exceeded 70 minutes in duration or those which were converted to open procedure. Dependent variable included demographic factors, clinical and sonographic findings. P value was kept at 0.05.

Results: During the study duration, 200 patients were included in the study undergoing for the laparoscopic cholecystectomy and out of this 85 had difficult outcome procedure. High BMI, hypertension, previous upper abdomen surgery, deranges AST and serum creatinine along sonographic findings of gall balder wall thickening and pericholecytsic edema were found to be significantly associated with difficult LC.

Conclusions: This study demonstrates that presence of various factors can predict the difficult outcome of laparoscopic cholecystectomy. This can help in minimizing the complication and council the patients regarding difficult procedure and need for conversion to open cholecystectomy, especially relevant for funds-limited settings like India.

Keywords: Gall bladder, Laparoscopic cholecystectomy, Calot's triangle

INTRODUCTION

Laparoscopic cholecystectomy (LC) is the standard treatment of symptomatic cholelithiasis and also among the most frequently performed surgical operations.[1] As experience with the operation grew, it is now indicated in almost all patients undergoing cholecystectomy.[2] But with this liberalized criteria for selecting patients, greater chances of difficulty in operation are known to exist and the higher converted from laparoscopic to open are the expected. It's a general consensus that the need for conversion to open is neither a complication nor a failure but actually a step to ensure patient safety and avoid complications.[3]

Some of the difficult situations faced during LC includes difficulty in creating pneumoperitonum, releasing adhesions, identifying the anatomy, anatomical variations and extracting the gall bladder.[4,5] However, defining "difficult laparoscopic cholecystectomy" is inconsistent in literature. It may refers to multiple technical difficulties faced intraoperative that increase the risk of complications in our case need for conversion to open-and significantly prolong the operative time.[6] Although

the level of difficulty may vary with skill and experience of the surgeon, predicting them pre operatively can help in preventing complications and safer and more cost-effective approach can be taken beforehand.[7] Thus this study was done with the objective of studying the factors causing difficult surgery in patients undergoing laparoscopic cholecystectomy.

METHODS

Study setting and population

This study was carried out over a period of 12 months from July 2015 to June 2016. The study population included all patients reporting to surgery OPD, Jawaharlal Nehru Medical College and Hospital, Aligarh Muslim University, Aligarh with various complains and being diagnosed as a case of cholelithiasis.

Inclusion criteria

All patients, belonging to any age group or sex, reporting with cholelithiasis from 1st July 2015 to 31st June 2016 were included in the study.

Exclusion criteria

Patients with absolute contraindications to LC like severe cardiovascular, pulmonary disease, coagulopathies and end stage liver disease. Any known gall bladder malignancy and those who did not gave the consent for study were excluded.

After applying inclusion and exclusion criteria, we were able to select a total of 200 patients diagnosed to be cholelithiasis during the study period.

Operational definitions

Difficult cholecystectomy was defined in this study as more than 70 minutes taken for laparoscopic cholecystectomy from insertion of Verees needle until extraction of gall bladder, more than 20 minutes taken to dissect the Calot's triangle, more than 20 minutes taken to dissect the gallbladder from liver bed and conversion to open cholecystectomy.

Study procedure

The study was approved by Institutional Ethics and Research Advisory Committee, JN Medical College, Aligarh. All the selected patients were assessed pre operatively and stabilized prior to surgery. They were explained about the study and given free will to participate in the study. Those who gave informed consent were included taken for planned operation with assessing difficulty levels according to previously laid guidelines. Total duration of surgery from the insertion of Veress needle to the closure of port site was noted by stop watch. Surgeons with experience of more than 50 laparoscopic cholecystectomies did all the surgeries in this study.

Data management and statistics

Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) Version 20. The categorical variables were represented by percentage (%). The statistical significance was tested by chi square test for categorical variable and independent t test for continuous variable. All tests were two tailed, and a p-value of ≤ 0.05 was considered significant.

RESULTS

Out of the total 200 patients in our study, 85 patients had difficult cholecystectomy surgery while 115 were grouped in easy category as shown in Figure 1.

The study participant had mean age of 40.95 ± 11.08 years, with majority of females (n=148). Most of the patients presented with chronic cholecystitis. Table 1 shows the demographic and clinical profile of the selected patients for the study. Association of various variables was analyzed by chi square test and independent t test which are shown in Table 2 and Table 3. It was found that high BMI, obesity, hypertension, previous hospitalization and surgery with abdomen scar, deranges AST and serum creatinine were found to be significantly associated with difficult LC. Among sonographic findings, gall balder wall thickening and pericholecytsic edema were found to be significantly associated with difficult LC.
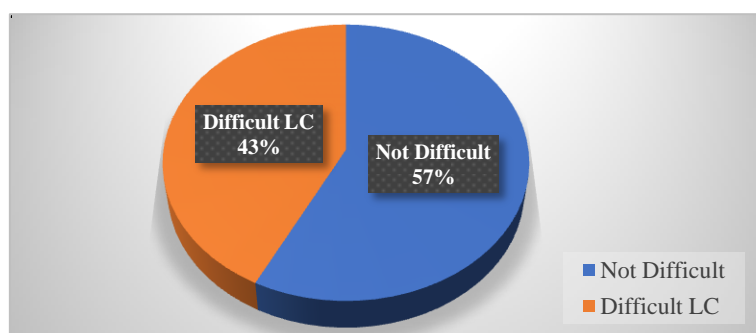

Figure 1: Distribution of patients according to difficult laparoscopic surgery.

Table1: Demographic profile of study population.

	Frequency	Percentage (%)
Age group (years)		
<25	18	9.0
25-59	153	76.5
60 and above	29	14.5
Sex		
Male	52	26.0
Female	148	74.0
Chief complaint		
Pain abdomen	157	78.5
Dyspepsia	25	12.5
Fever	4	2.0
Vomiting	9	4.5
Jaundice	3	1.5
Heaviness	2	1.0
Previous hospitalization		
Absent	173	86.5
Present	27	13.5
Previous surgery		
Yes	32	16.0
No	168	84.0
Abdomen scar		
Absent	168	84.0
Upper	14	7.0
Lower	18	9.0
Diabetes mellitus		
Absent	183	91.5
Present	17	8.5
Hypertension		
Absent	35	17.5
Present	165	82.5
Obesity		
Under weight	5	2.5
Normal	135	67.5
Over weight	40	20.0
Obese	16	8.0
Morbid obese	4	2.0
History of smoking		
Absent	181	90.5
Present	19	9.5

Table 2: Comorbidity and biochemical profile of patients.

Factor	Easy N (%) or Mean±SD	Difficult N (%) or Mean±SD	Total	P value
Sex				
Male	28 (53.8)	24 (46.2)	52	0.54
Female	87 (58.8)	61 (41.2)	148	
Age (years)	42.6±14.8	39.8±12.2		0.15
BMI	21.3±1.9	23.2±2.8		<0.001
DM				
Absent	104 (56.8)	79 (43.2)	183	0.53
Present	11 (64.7)	6 (35.3)	17	

Continued.

Factor	Easy	Difficult	Total	P value
	N (%) or Mean±SD	N (%) or Mean±SD		
Hypertension				
Absent	101 (61.2)	64 (38.8)	165	0.02
Present	14 (40.0)	21 (60.0)	35	
Obesity				
Under weight	5 (100.0)	0 (0.0)	5	
Normal	86 (63.7)	49 (36.3)	135	
Over weight	20 (50.0)	20 (50.0)	40	0.001
Obese	4 (25.0)	12 (75.0)	16	
Morbid obese	0 (0.0)	4 (100.0)	4	
History of smoking				
Absent	106 (58.6)	75 (41.4)	181	0.35
Present	9 (47.4)	10 (52.6)	19	
Previous hospitalization				
Absent	107 (61.8)	66 (38.2)	173	0.002
Present	8 (29.6)	19 (70.4)	27	
Previous surgery				
Yes	10 (31.3)	22 (68.8)	32	0.001
No	105 (62.5)	63 (37.5)	168	
Abdomen scar				
No	105 (62.5)	63 (37.5)	168	
Upper	3 (21.4)	11 (78.6)	14	0.003
Lower	7 (38.9)	11 (61.1)	18	
LFT				
SGOT or AST	55.4±13.6	50.0±19.2		0.03
ALT (IU/l)	99.3±31.4	103.2±66.6		0.62
ALP (IU/l)	62.3±29.5	67.0±31.2		0.29
CBC				
Hb %	12.1±1.9	11.8±1.4		0.24
TLC	8009.7±2311.7	7382.4±2482.9		0.07
BU	26.4±6.8	26.3±6.4		0.91
S. cretanine	0.8±0.2	1.0±0.5		0.001
Bilirubin total	0.8±0.3	0.9±0.4		0.42

Table 3: Ultrasonographic finding of symptomatic cholelithiass patient.

USG findings	Easy	Difficult	Total	P value
	N (%)	N (%)		
Gallbladder wall thickness				
Normal	108 (60.3)	71(39.7)	179	0.018
Abnormal	7 (33.3)	14 (66.7)	21	
Stones				
Single	26 (60.5)	17 (39.5)	43	0.657
Multiple	89 (56.7)	68 (43.3)	157	
Pericholecytsic edema				
Present	3 (25.0)	9 (75.0)	12	0.019
Absent	112 (59.6)	76 (40.4)	188	
CBD diameter				
Normal	115 (57.5)	85 (42.5)	200	NA
Abnormal	0 (0.0)	0 (0.0)	0	
CBD stone				
Present	0 (0.0)	1 (100.0)	1	0.244
Absent	115 (57.8)	84 (42.2)	199	

Continued.

USG findings	Easy	Difficult	Total	P value
	N (%)	N (%)		
Liver				
Normal	110 (57.6)	81 (42.4)	191	0.904
Abnormal	5 (55.6)	4 (44.4)	9	

DISCUSSION

The present study was done to assess the factor causing difficulty in performing LC among patients present to general surgery OPD. A total of 43% (85/200) patients had difficult laparoscopic cholecystectomy among the study population.

Several factors were studied which may be responsible for difficulty during LC. These include age, sex, body mass index, obesity, hypertension, diabetes mellitus, smoking, previous hospitalization and surgery, complete blood count, LFT, RFT, ultrasound, etc. It was found that high BMI, obesity, hypertension, previous hospitalization and surgery with abdomen scar, deranges AST and serum creatinine were found to be significantly associated with difficult LC. Among sonographic findings, gall balder wall thickening and pericholecytsic edema were found to be significantly associated with difficult LC.

Although, many researchers have found older age and male sex to be predictor of conversion of LC to open, we did not found any relationship between age and gender of patients. Male had higher difficulty in LC in our study, but this was not found to be statistical significant. Patients with high BMI were having significantly difficulty LC which was also describe in previous studies across the world.[8-12] Further analysis showed that 75% of cases with obesity and all the cases having morbid obese had difficulty LC.

We also found that those who had previous hospitalization and those with history of previous abdomen surgery were higher risk for difficult LC and this was significant in statistical analysis. Among those who has abdomen surgery, patients with history of upper abdomen surgery were significantly associated with risk of difficulty LC. These finding could be due to gall-bladder being difficult to dissect because of dense adhesions with the surrounding structures as a result of previous surgery. Previous history of upper abdominal surgery is show by Nachnani et al and Randhawa et al in their study.[8,11] While others have shown significant association of previous surgery and hospitalization with risk factor of conversion into open of LC.[10,13-15]

In regards to blood investigation, there are different results from different studies. While we found deranges AST and serum creatinine to be significantly associated with difficult LC, other researchers have found associations with abnormal serum hepatic and pancreatic enzyme profiles, elevated ALP and elevated CRP level,

WBC count are predictors for difficult LC leading to conversion.[2-4,13,16]

Apart from helping in diagnosis, a abdomen ultrasound is advised by many researchers for predicting difficulty that could arise in LC. We found gall balder wall thickening and presence of pericholecytsic edema in sonograpy to be significantly predicting difficult LC. Gall bladder wall thickness is very strong risk factor for difficult LC and shown by many researchers.[5,8,11,14,15,17,18] Similar to our study finding presence of pericholecytsic edema is also described by Stanisic et al prediction of difficulties of laparoscopic cholecystectomy.[18] Moreover Lal et al in their study have gone further and proposed to use sonography as a screening procedure in predicting the potential difficulty to be faced in surgery.[17]

CONCLUSION

We found in our setup that those patients undergoing for LC, if they found to be having high BMI, hypertension, history of previous upper abdomen surgery, deranged LFT or RFT, and gall bladder wall thickening and pericholecytsic edema in ultrasound, they are high risk for having difficulty during LC. Thus in these patients, dissection of Gall bladder should be carefully performed, keeping in mind the possibility of difficult LC and the need for conversion to open surgery.

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