

Original Research Article

A study of preoperative factors predicting a difficult laparoscopic cholecystectomy

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ABSTRACT

Background: Laparoscopic cholecystectomy is considered the gold standard treatment for most gallbladder diseases. It has now become one of the most common operations performed by general surgeons. At times, it is difficult and takes longer time or some complications may occur or has to be converted in to open cholecystectomy. This study is undertaken to determine predictive factors for difficult laparoscopic cholecystectomy. The aim of the study was to study pre-operative factors in the patients to predict whether the laparoscopic cholecystectomy will be easy or difficult. And to co-relate the pre-operative factors predicting a difficult Laparoscopic Cholecystectomy with intra-operative findings.

Methods: This prospective study was carried out in the Department of General Surgery in IGGMC, Nagpur, Maharashtra, India over a period of 2.5 years. Total 52 patients were included in the study. All patients were evaluated for risk factors preoperatively and intraoperative findings were noted. A chi-square test has been used to find the significant association of findings of the preoperative score with postoperative outcome.

Results: History of hospitalization for gall stone diseases, ultrasound abdomen showing gall bladder wall thickness >4 mm, presence of pericholecystic collection, and impacted stone can be considered as individual significant positive predictive factors to predict a difficult laparoscopic cholecystectomy preoperatively. While age >50 years, gender, BMI >25 kg/m², and history of supraumbilical surgery/scar can't be considered as an individual positive predictive factor.

Conclusions: A uniform scoring system needs to be assessed and thoroughly evaluated by combining all these factors to predict a difficult laparoscopic cholecystectomy.

Keywords: Laparoscopic cholecystectomy, Difficult, Predictive factors, Gall stone diseases, Open cholecystectomy

INTRODUCTION

Cholecystectomy was considered as the surgical procedure for the management of symptomatic gall stone disease in 1882 when its pioneer Carl Johann Langenbuch performed the first open cholecystectomy for cholelithiasis.¹

In 1987, Philippe Mouret performed the first laparoscopic cholecystectomy.² The advantages of

laparoscopic cholecystectomy are as Earlier return to bowel function, Less postoperative pain, Cosmetics, Shorter length of hospital stay, earlier return to full activity, Avoidance of large surgical incision, and Decreased overall cost.³⁻⁵

Laparoscopic cholecystectomy (LC) though considered safe and effective, yet can become difficult at times due to various problems faced during a surgical procedure. Various problems encountered include problems in

identifying anatomy secondary to adhesions or inflammation, anatomical variation, creating pneumoperitoneum, accessing peritoneal cavity, releasing adhesions, fibrotic and contracted gall bladder, and extracting the gall bladder. Preoperative prediction of “difficult laparoscopic cholecystectomy” may help in improving patient safety, proper preoperative planning and counselling, deciding the approach (open/laparoscopic), reducing conversion rate, and reduce overall complications and morbidity. The present study is commenced to identify the various factors that can predict difficulty in laparoscopic cholecystectomy and thus complications can be prevented beforehand and a better patient outcome can be given.

METHODS

This study was carried out in Govt. medical college over a period of 2.5 years (June 2019 to November 2021), in Indira Gandhi Government Medical College and Hospital, Nagpur, Maharashtra, India.

Type of study

The type of study was prospective observational.

Patients having acute or chronic calculous cholecystitis, gall bladder polyps, and symptomatic cholelithiasis irrespective of age, sex is included in this study. Patients having associated CBD calculi, gallbladder perforations, Acalculous cholecystitis, Pre-operative diagnosed Mirizzi Syndrome, suspected or proven gall bladder malignancy, deranged LFT, and Features of obstructive jaundice, unfit for general anaesthesia have been excluded.

The patients were evaluated preoperatively with detail history, examination, blood investigations, and USG abdomen after overnight fasting.

Following preoperative factors were considered in this study: Age, Gender, History of hospitalization for gall stone diseases, history of previous supraumbilical surgery, body mass index, and usg findings as -gall bladder wall thickness, pericholecystic collection, impacted stone at the neck of GB. All study factors were evaluated as dichotomous variables.

Intraoperative findings were noted as:

Easy- time taken for surgery (time taken from insertion of first port to removal of last port) is less than 60 minutes, no bile spillage, no injury to bile duct/ vascular structures.

Difficult- time taken for surgery is 60-120 minutes, bile or stone spillage, vascular/bile duct injury but no conversion.

Very difficult- time taken >120 minutes, conversion to open cholecystectomy.

Table 1: Criteria for difficulty on intra operative findings.

Factors	Easy	Difficult	Very difficult
Time taken	<60 min	60-120 min,	>120 min.
Bile/stone spillage	No	Yes	Yes
Injury to duct/artery	No	Duct only	Both
Conversion to open	No	No	Yes

Ethical approval

The present study was approved by the Institutional Ethics Committee, IGGMC, Nagpur.

Sampling technique

Sample size calculated by universal sampling method. Study population included those who fulfil inclusion criteria of the study and those who did not fulfil criteria were excluded from study over a period of 2 and half years.

Statistical methods

The statistical software namely Statistical package for social sciences (SPSS) 22.0, was used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables, etc. Categorical data represented in frequencies and proportions. Chi-square test has been used to find the significant association of findings of preoperative score with post operative outcome. $P < 0.05$ is considered as statistically significant value.

RESULTS

Total 54 patients were enrolled for this study but 1 patient intraoperatively had Gall Bladder perforation and another patient had Mirizzi syndrome so, both these patient were excluded from the study. So, remaining 52 patients were enrolled in our study, out of which 17 were male and 35 were females with sex ratio of 1:2.05. The youngest and oldest participant is 15 and 80 years respectively with mean age as 38.8 years. The mean age of male and female participants was 38.35 and 39.03 respectively. The commonest age group is 31 to 40 years (17 patients, 32.7%).

Most patients in our study group were female, 35 out of 52 (67.3%) even literature supports increased risk of gallstone disease in females.

Bile spillage was observed in 6 patients (11.5%) which was managed by irrigation and suction, none of them were converted to open cholecystectomy.

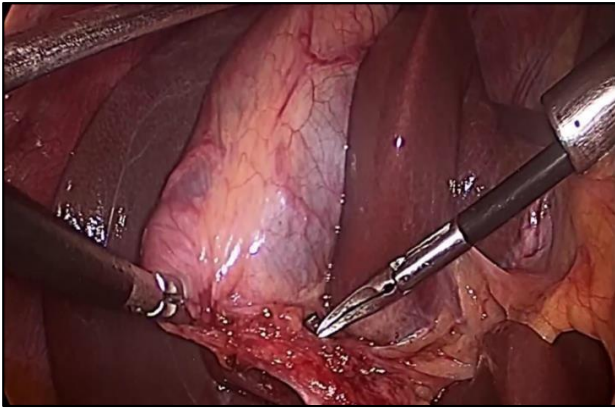


Figure 1: Creating a posterior window and defining calot's triangle.

Conversion rate reported in literature is in between 7 and 35%. In our study it is 7.69 %. (4 out of 52). Reason for

conversion was heavy bleeding in one case, dense adhesions between gall bladder and omentum and duodenum or transverse colon making frozen calot's triangle in remaining three cases.

The preoperative factors are shown in Table 2.

No significant association was found between the age >50 years (p-0.265), male gender (p-0.569), BMI >25 kg/m² (p-0.865), history of previous supraumbilical surgery (p-0.254) and intraoperative difficulty during laparoscopic cholecystectomy. We found significant relation between History of hospitalisation for gall stone diseases (p-0.045), gall bladder wall thickness >4 mm (p-0.036), pericholecystic collection (p-0.0065), impacted stone at the neck of gall bladder (p-0.036).

Out of 52 patients, 19 patients took <60 min, 29 patients took time 60-120 min. 4 patients were converted to open cholecystectomy.

Table 2: Pre operative scoring parameters.

Parameters	Criteria	No. of patients	Percentage
Age (years)	<50	37	71.15
	>50	15	28.85
Gender	Male	17	32.70
	Female	35	67.30
H/o previous hospitalization For gall stone diseases	No	40	76.93
	Yes	12	23.07
BMI	<25	32	61.54
	>25	20	38.46
Abdominal scar	No	46	88.47
	Yes	06	11.53
GB wall thickness	<4 mm	43	82.69
	>4 mm	09	17.31
Pericholecystic collection	No	42	80.76
	Yes	10	19.24
Impacted stone	No	37	71.15
	Yes	15	28.85

Table 3: Intraoperative outcome with p value.

Criteria		Easy	Difficult	Very difficult	P
Age (years)	<50	15	18	4	0.265
	>50	3	11	1	
Gender	Male	6	9	2	0.596
	Female	13	20	2	
BMI (kg/m ²)	<25	15	14	3	0.865
	>25	4	15	1	
Abdominal scar	Yes	1	4	1	0.254
	No	21	23	2	
H/O hospitalisation	Yes	2	9	1	0.045
	No	23	15	2	
GB wall thickness (mm)	<4	25	16	2	0.036
	>4	1	7	1	
Pericholecystic collection	Yes	1	7	2	0.0065
	No	27	13	2	
Impacted stone	Yes	4	10	1	0.0267
	No	25	11	1	

Continued.

DISCUSSION

In general age above 50 years makes LC difficult with increasing age due to recurrent attacks of cholecystitis and increased age has more chances of previous history of operative surgery.^{6,7} The findings of the present study in relation to age more than 50 years as a predictive factor for difficult LC and age as a criteria found to be insignificant ($p=0.265$) and it is comparable with previous studies but not comparable to Husain et al, mostly as the age selection criteria of study group of was 34 to 65 years and is different from present study.^{5,8-11}

Men with symptomatic gall stone disease are more prone to inflammation and fibrosis with the same disease intensity as compared to females, hence male gender is considered as predictive factor for difficult LC. We found that male gender is insignificant factor for predicting a difficult LC ($p=0.596$) and it is consistent with previous studies but not corresponds with the study done by Vijay Kassa et al as male to female ratio in their study is very high.^{5,8-11}

Obesity causes obvious difficulty in the placement of the umbilical port as the umbilicus is displaced downwards and there is difficulty to identify the umbilical fascia. And due to excess amount of fat it becomes difficult to identify anatomy. Hence, body mass index $>25 \text{ kg/m}^2$ considered as a criteria to predict a difficult LC. We found that BMI $>25 \text{ kg/m}^2$ is insignificant factor for predicting a difficult LC ($p=0.865$) and is consistent with previous studies but not consistent with study conducted by Bunkar et al as in their study criteria was $>30 \text{ kg/m}^2$ which is clearly falls under obesity.^{5,8-10,12}

Previous surgical intervention can cause adhesions. Presence of adhesions especially umbilical and supraumbilical are proven to be predictors of difficult LC, limiting the assess to target the gall bladder.¹³ Hence presence of supraumbilical scar is considered as predictive factor for difficult LC. We found that, history of upper abdominal surgery/supraumbilical scar is insignificant factor for predicting a difficult LC. ($p=0.254$) and is consistent with previous studies but not with study conducted by Agrawal et al because of in their study, number of patients were less as well as nearly 1/3rd out of 30 had a supraumbilical scar.^{5,8-10,12}

Repeated attacks of cholecystitis make gall bladder fibrosed and contracted thus posing problems to grasping the GB. Hence history of hospitalisation for gall stone diseases is considered as predictive factor for difficult LC. In present study, we found that history of hospitalisation for gall stone diseases is a significant factor for predicting a difficult LC ($p=0.045$) and is consistent with previous studies.^{5,8,10-12} Presence of inflammation of the gall bladder make it difficult to hold the GB with delicate instruments of laparoscopy thus

posing problems to grasping the gall bladder and leading to increase in operative time and difficulty in manipulating the GB. In the present study GB wall thickness less than 4 mm was considered as factor to predict easy LC and GB wall thickness $>4 \text{ mm}$ was considered as a factor to predict difficult LC. We found that, GB wall thickness more than 4 mm is significant factor for predicting a difficult LC ($p=0.036$). and is consistent with previous studies.^{5,8-10}

Presence of inflammatory fluid outside gall bladder are more associated to have dense adhesions and also associated with difficulty identifying calot's triangle due to inflammation and distortion of anatomy. Hence, presence of pericholecystic collection seen on USG is considered as factors for predicting a difficult LC and absence of pericholecystic collection is considered as factor for predicting an easy LC. In the present study, we found that presence of pericholecystic collection is significant factor for predicting a difficult LC ($p=0.0065$).and is consistent with previous studies.^{9,10,12}

Impacted stone at the neck of gall bladder makes LC difficult at the time of calot's dissection and during the times of duct identification and clipping ,also presence of large stones in the gall bladder neck leads to distention and difficulty in grasping. In present study, impacted stone at the neck of GB was considered as predictive factor for difficult LC and a mobile stone or a stone elsewhere in GB is considered as factor to predict an easy LC. We found that, impacted stone at the neck of GB is significant factor for predicting a difficult LC ($p=0.0267$) and is consistent with previous studies.^{5,9,10,12}

Other factors like adhesions and anatomical variations are important factors to cause difficulty in laparoscopic cholecystectomy these factors usually can not be diagnosed in routine abdominal sonography was not included in the present study. Another important factor that plays a role in time requirement for the procedure is surgical expertise of operating surgeon.

CONCLUSION

Previous history of hospitalization for gall stone diseases, an ultrasound abdomen showing gall bladder wall thickness $>4 \text{ mm}$, presence of pericholecystic collection, and an impacted stone at the neck of gall bladder can be considered as individual significant positive factors to predict a difficult laparoscopic cholecystectomy preoperatively. While age >50 years, male gender, body mass index $>25 \text{ kg/m}^2$, and history of supraumbilical surgery or supraumbilical scar can not be considered as an individual positive predictive factors for a difficult laparoscopic cholecystectomy. A uniform scoring system needs to be assessed and thoroughly evaluated by combining all these factors to predict a difficult laparoscopic cholecystectomy.

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