

Assessment of Pre - Operative Outcome with Intra - Operative Findings in Laparoscopic Cholecystectomy

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Abstract: *Background & Objectives:* Cholelithiasis is a common disease throughout the world and if untreated it may lead to various complications. Laparoscopic cholecystectomy is the current gold standard for the treatment and it can be difficult depending upon the severity. There are numerous preoperative scoring systems proposing preoperative parameters reported for difficult cholecystectomy. However, there is no operative classification for laparoscopic surgery. The present study was aimed to assess the various preoperative predictors (history/ clinical/ imaging) and develop a scoring method for difficult laparoscopic cholecystectomy with a secondary objective of correlating preoperative predictive factors with intraoperative difficulty in lap cholecystectomy. *Methods:* 82 patients between age 18 - 60 years with acute and chronic calculous cholecystitis who required cholecystectomy were included in this study. A preoperative score was given to all the patients based on scoring system employed by Gupta et al. and intraoperative assessment was compared with preoperative predictive score. *Results:* In 91.5% cases there was a correlation between pre - operative grading and operative time grading and only 8.5% cases did not match. *Conclusion:* The observation of the present study suggests that the pre - operative scoring system employed in the study turned out to be a reliable and beneficial tool in predicting the difficulty of laparoscopic cholecystectomy

Keywords: Cholelithiasis, Laparoscopic cholecystectomy, Preoperative scoring, Intraoperative scoring

1. Introduction

Cholelithiasis is a common disease throughout the world. The prevalence among adults is approximately 10 - 20% in West and 4.3% in India. [1] Approximately 80% of the patient with gallstones are asymptomatic. [2] Serious symptoms may appear in 1 - 2% among persons with asymptomatic gallbladder stones. [3]

The pathophysiology is secondary bacterial inflammation of the gall bladder as a consequence of the cystic duct obstruction. [4] Cholecystectomy is the commonest operation of the biliary tract and Laparoscopic cholecystectomy (LC) is the standard operative procedure for the treatment of symptomatic gallbladder disease. [5, 6]

The current gold standard for the treatment of symptomatic cholelithiasis is laparoscopic cholecystectomy. [7, 8] After the first documented laparoscopic cholecystectomy (LC) was performed by Erich Mühe in Germany in 1985, the laparoscopic approach was declared the gold standard in 1993 by the National Institutes of Health (NIH) consensus conference. [9]

Although laparoscopic surgery has replaced open cholecystectomy, the possibility of CBD injury in the latter surgery is higher. Timely diagnosis and management are very important for the patients' health. [10]

Pain is the most common reason for cholecystectomy and can also be removed to treat biliary dyskinesia or gallbladder cancer. [11, 12]

The severity of cholecystitis may be different in every patient and performing laparoscopic cholecystectomy may be difficult accordingly. Conversion from laparoscopic to open cholecystectomy is the essential part of the safe surgical practice if the anatomy is unclear, if complications

arise, or if there is failure to make reasonable progress in a timely manner.

The need for conversion is neither a failure nor a complication but simply a step taken to ensure patient safety and avoid complications. [13] LC is beneficial compared to traditional open cholecystectomy in terms of reduced pain postoperatively, decrease length of hospital stay, and improved and fast recovery of patients. [14] Sometime, the laparoscopic cholecystectomy may pose undue difficulties during access or dissection and it is considered as a "difficult" when safe completion of the laparoscopic procedure cannot be ensured. [15, 16]

There are numerous preoperative scoring systems proposing preoperative parameters reported for difficult cholecystectomy. [17, 18] However there is no operative classification for laparoscopic surgery.

Preoperative and intraoperative factors, such as male gender, old age, body mass index (BMI), history of abdominal surgery, acute cholecystitis along with fever, leukocytosis, presence of gall bladder stones, and certain ultrasonographical findings (distension of the gallbladder, thick gallbladder lining, impacted stone, and pericholecystic fluid collection) are the risk factors that make laparoscopic cholecystectomy cumbersome.

Over the previous several years, numerous studies on predictive capabilities of scoring systems for DLC were published, but there is no clear consensus regarding the parameters predicting the DLC. [19, 20]

A study by **Kama et al** reported six parameters — advancing age, male gender, history of abdominal surgery, upper abdominal tenderness at the time of surgery, sonographically diagnosed thickened gallbladder wall and the preoperative diagnosis of acute cholecystitis that were

significantly associated with the risk of open cholecystectomy. [21]

A preoperative scoring system based on history, clinical examination, and sonographic findings compared with the score given based on intra-operative difficulties aids in predicting the difficulty of laparoscopic cholecystectomy. This scoring system helps to decide the surgical approach, reduce the complication rate, rate of conversion, counsel the patients, and overall medical cost.

Veeranki N et al in their study found Sensitivity and specificity of this scoring method were 86.36 % and 75 %, respectively for cases predicted to be easy (score 0–5). The positive predictive value was 90.48 % for easy and 66.67 % for difficult cases using this scoring method.

Similar findings were also observed by **Randhawa JS et al.** in 2009 (88 - 92%, easy to difficult) and **Dhanke P S et al.** in 2014 (94.05 - 100%, easy to difficult) " [22, 23]

Therefore, the present study was conducted with the aim to study and evaluate the different factors which are responsible for difficult Laparoscopic Cholecystectomy.

2. Methodology

This is Cross sectional Hospital based study that was conducted on 82 patients, over a period of two years in Department of General Surgery at Institute of Medical Sciences & SUM Hospital, Bhubaneswar after obtaining ethical clearance. A written informed consent was obtained from the study subjects.

All the patients with acute and chronic calculous cholecystitis who required cholecystectomy were included in the study.

- Patients presenting with signs and symptoms of cholelithiasis/cholecystitis and diagnosed by USG W/A & clinical examination between age 18 - 60 years were included in the study.
- Exclusion criteria were patients below 18 years, patients with common bile duct (CBD) calculus and dilated CBD, where CBD exploration is needed, patients with features of obstructive jaundice, patients refusing surgery, or not willing for laparoscopic cholecystectomy, and pregnant females.

A scoring system employed by **Gupta et al** was used in this study. [19] A preoperative score was given to all the patients based on history, clinical examination, and sonographic findings one day prior to the surgery. Patients with scores of 0–5, 6–15, and 10–15 were predicted as easy, difficult, and very difficult cases respectively.

Surgery was performed using carbon dioxide (CO) pneumoperitoneum with 10 mmHg pressure and two 5 mm and two 10 mm standard ports. Time was noted from 1st port site insertion till last port closure.

All intraoperative events such as duration of surgery, bile/stone spillage, and injury to duct/artery were recorded, and based on these findings surgery was labelled as easy/difficult/ and very difficult. Intraoperative assessment

was compared with preoperative predictive score to determine the usefulness of preoperative predictive score.

Table 1: Pre - operative Scoring Parameters

	Level	Score
Age (years)	≤50	0
	>50	1
Gender	Male	1
	Female	0
H/O Hospitalisation for acute cholecystitis	Yes	4
	No	0
Clinical Parameters		
BMI (kg/m ²)	<25	0
	25 - 27.5	1
	>27.5	2
Abdominal Scar	No	0
	Infraumbilical	1
	Supraumbilical	2
Palpable Gall bladder	Yes	1
	No	0
Sonographic Findings		
Gall Bladder wall thickness (mm)	Thin (<4)	0
	Thick (≥4)	2
Pericholecystic Collection	No	0
	Yes	1
Impacted Stone	No	0
	Yes	1

Table 2: Intra Operative Assessment

Parameters	Grading
Operative time <60 minutes	Easy
No Bile spillage	
No injury to duct	
Operative time 60 - 120 minutes and/ or	Difficult
Bile or stone spillage and/ or	
Injury to duct	
Operative time >120 minutes or conversion	Very Difficult

Statistical Analysis

Data collected during survey was entered in excel sheet and was subjected to statistical analyses. Data were analysed using the statistical package SPSS version 19.0. The results presented in frequency tables, cross tabulations and figures. Categorical data are presented as frequency with percentages. Continuous data with normal distribution are presented as mean with standard deviation. The sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of USG findings with intra-operative findings were evaluated. A p value <0.05 was considered statistically significant.

3. Results and Discussion

The present study was conducted with the aim to study and evaluate the different factors which are responsible for difficult Laparoscopic Cholecystectomy.

Age and Gender Distribution: In our study we observed that majority of the study subjects were aged above 40 years i. e. 50 patients (61%). The mean age of the study participants was 43.37 years and there was a female preponderance with 57.3% female and 42.7% male patients. Male to female ratio was 1: 1.34.

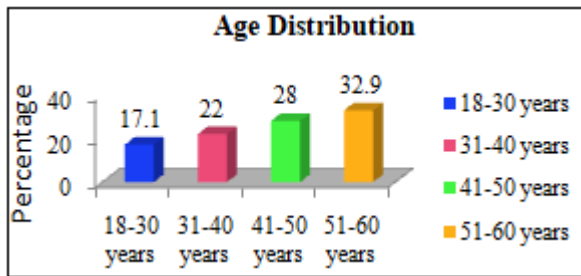


Figure 1: Age Distribution

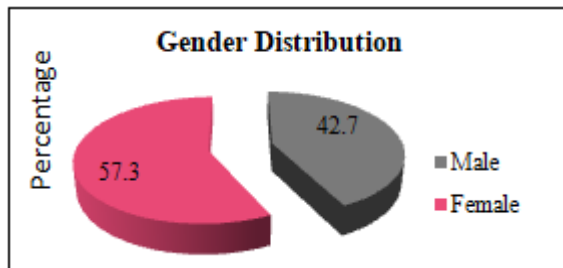


Figure 2: Gender Distribution

Co - morbidities and BMI: A vast majority of the study subjects were presented with no co - morbidities (80.5%), while 8.5% patients had diabetes, 6.1% had hypertension and 4.9% had both diabetes and hypertension in the present study.

Majority of the study subject had BMI below 25kg/m² (41.5%), followed by 36.6% (30) patients who had BMI between 25 to 27.5 kg/m² and only 22% patients had BMI above 27.5 kg/m² with a mean BMI of 25.60 kg/m² and only 12 (14.6%) had history of hospitalization.

Regarding abdominal scar we found in the present study 22 (26.8%) patients had infraumbilical scar while 3.7% (3) patients had supraumbilical scar and majority of them (69.5%) had no scar. Incidence of palpable GB was only 7.3% in the present study.

A vast majority of the study subjects had gall bladder wall thickness <4 mm (85.4%) while only 12 (14.6%) had GB wall thickness ≥4 mm.

Among 82 patients only 7 (8.5%) had pericholecystic collection and only 4 (4.9%) patients had impacted stone.

According to pre - operative factors of grading we found 12 (14.6%) patients had grading of difficult while only 2 (2.4%) patients had very difficult scoring and rest of the others i. e.68 (82.9%) patients had easy scoring.

Table 3: Grading of Preoperative Scoring

Grading	Frequency	Percentage
Easy (0 - 5)	68	82.9
Difficult (6 - 10)	12	14.6
Very Difficult (11 - 15)	2	2.4
Total	82	100.0

Majority of them had operative time less than 60 minutes (79.3%), while 18.3% had operative time between 60 to 120 minutes and 2.4% had operative time more than 120 minutes.

Table 4: Operative Time (minutes)

Operative Time (minutes)	Frequency	Percentage
<60 minutes	65	79.3
60 - 120 minutes	15	18.3
>120 minutes	2	2.4
Total	82	100.0

According to intra - operative scoring 79.3% had easy scoring, 18.3% had difficult scoring and 2.4% had very difficult scoring.

Table 5: Grading of Intra - operative Scoring according to Duration of Surgery

Grading	Frequency	Percentage
Easy	65	79.3
Difficult	15	18.3
Very Difficult	2	2.4
Total	82	100.0

Above analysis we found most of the time there was a correlation between pre - operative grading and operative time grading. In 91.5% cases there was a correlation and only 8.5% cases it did not matched.

Table 6: Correlation between Pre - operative and intra - operative scoring

Correlation	Frequency	Percentage
Yes	75	91.5
No	7	8.5
Total	82	100.0

The sensitivity, specificity, PPV, NPV and accuracy of preoperative USG finding was 96.92%, 70.59%, 92.65%, 85.71% and 91.46% respectively.

Table 7: Sensitivity, Specificity, PPV, NPV and Accuracy of USG findings

Calculations	Values	95% CI
Sensitivity	96.92%	89.32% to 99.63%
Specificity	70.59%	44.04% to 89.69%
PPV	92.65%	85.77% to 96.34%
NPV	85.71%	59.71% to 96.05%
Accuracy	91.46%	83.20% to 96.50%

The observation of the present study suggests that most of the preoperative risk factors such as age, history of hospitalization, abdominal scar, palpable GB, gall bladder wall thickness, pericholecystic collection and impacted stone were significantly correlated with intra - operative outcome. Only sex and BMI showed no significance in the present study.

Table 8: Correlation test between Different variables

Variables	r value	p value
Age	.555	<0.0001
Sex	-.150	0.180
BMI	.188	0.091
History of Hospitalization	.523	<0.0001
Abdominal Scar	.523	<0.0001
Palpable GB	.650	<0.0001
Gal Bladder wall thickness	.451	<0.0001
Pericholecystic Collection	.493	<0.0001
Impacted Stone	.365	0.001

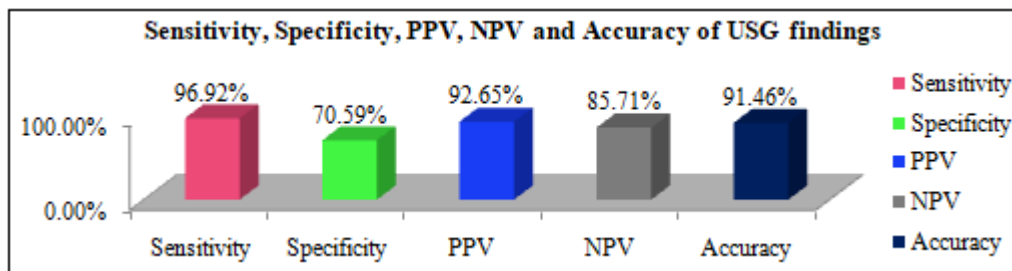


Figure 3: Sensitivity, Specificity, PPV, NPV and Accuracy of USG findings

4. Conclusion and Future Scope

The observation of the present study suggests that the pre-operative scoring system employed in the study is turned out to be a reliable and beneficial tool in predicting the difficulty of laparoscopic cholecystectomy.

Most of the preoperative risk factors except gender and BMI showed significant association with intra-operative outcome.

Using, this new operative scoring system, it could be better predicted operative cases which would likely be converted to open. The classification could be extremely beneficial in improving patient's outcome.

However, further randomized, prospective, multicentric studies with large sample size are required to validate the efficiency of the scoring system.

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