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Original research article

Study of pre-operative prediction of difficult laparascopic cholecystectomy

[1]Dr. Ranjith BS, [2]Dr. Dhananjaya BM, [3]Dr. Sagar Z, [4]Dr.Veershetty

[1]Consultant, Department of Surgery, Trustwell hospital, Bangalore, Karnataka, India
[2]Assistant Professor, Department of Surgery, Raja rajeshwari Medical College, Bangalore, Karnataka, India
[3]Assistant Professor, Department of Surgery, MS Ramaiaha Medical College, Bangalore, Karnataka, India
[4]Assistant Professor, Department of Surgery, ESIC PGIMSR Medical College, Bangalore, Karnataka, India

Corresponding Author:
Dr.Veershetty

Abstract
Laparoscopic cholecystectomy (LC) since its inception in 1987, has dramatically replaced conventional open cholecystectomy. LC has rapidly become the gold standard for routine symptomatic gallstone disease. Management of biliary tract disease has evolved from being a major procedure to a relatively safe and day care procedure today, offering early return to full activity. All the patients were scored pre-operatively according to history, clinical examination, biochemical parameters, and sonological findings. In our study increased GB wall thickness (>4mm) showed statistically significant to predict difficulty with p value <0.01. In our study the results were Sensitivity=96%, Specificity=68, 67%, PPV=68.6%, NPV=96.0%.
Keywords: Prediction, difficult laparascopic cholecystectomy, GB wall thickness

Introduction

Laparoscopic cholecystectomy (LC) is one of the most common laparoscopic procedures being performed by general surgeons all over the world. Preoperative prediction of the risk of conversion or difficulty of operation is an important aspect of planning laparoscopic surgery. The purpose of our prospective study is to analyze various risk factors and to predict difficulty preoperatively by the use of a scoring system [1].

Laparoscopic cholecystectomy (LC) since its inception in 1987, has dramatically replaced conventional open cholecystectomy. LC has rapidly become the gold standard for routine symptomatic gallstone disease. Management of biliary tract disease has evolved from being a major procedure to a relatively safe and day care procedure today, offering early return to full activity.

LC though safe and effective, yet can be difficult at times. Various problems faced are difficulty in creating pneumo peritoneum, accessing peritoneal cavity, releasing adhesions, identifying anatomy, anatomical variation, dissection of Calot's triangle, avoiding injury to common bile duct and extracting the gall bladder. LC with these problems along with time taken more than normal we considered as difficult [2].

LC is the common difficult laparoscopic surgery performed by surgeons all over the world. This study is based on the assumption that difficulty can be predicted and its design is directed towards identification of these predictors, decrease post-operative complication and conversion rate

Gallstone disease is one of the most common problems affecting the digestive tract. Autopsy reports have shown a prevalence of gallstones from 11% to 36% [3].

The prevalence of gallstones is related to many factors, including age, gender, and ethnic background. Certain conditions predispose to the development of gallstones. Obesity, pregnancy, dietary factors, Crohn's disease, terminal ileal resection, gastric surgery, haemolytic anaemia, hereditary spherocytosis, sickle cell disease, and thalassemia are all associated with an increased risk of developing gallstones [4].

Women are three times more likely to develop gallstones than men, and first-degree relatives of patients with gallstones have a twofold greater prevalence.

Methodology

Study population

Inpatients admitted in General Surgery Department, who underwent laparoscopic Cholecystectomy.

Study Design: Prospective study
Sample size = 60 Sample Size Calculation n =Z 2 x (p) x (1-p)/c 2

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Where
Z = Z value (e.g. 1.96 for 95% confidence level) p =sensitivity c = absolute precession (e.g., .05 = ±5)

A sample size of 60 will have 90% power to detect sensitivity is unlikely to exceed 96% (Based on published article by Gupta N, *et al*.). In this calculation we used the following assumptions: We expect sensitivity estimated within 5 percentage points of the true value (965) with 95% confidence interval.

N= (1.96)2X (0.96) X (1-0.96)/ (0.05)2=59

Inclusion criteria
All the patients >18years of age with symptomatic gallstone disease

Exclusión criteria
Exclusión criteria included
1. Patients unfit for General Anesthesia.
2. Patients who did not give consent to be included in the study.
3. Pregnant women.
4. Patients who were under 18 years of age.
5. patient admitted with current attacks of cholecystitis >72hrs

Methodology
All the patients were scored pre-operatively according to history, clinical examination, biochemical parameters, and sonological findings.

Results

Table 1: Gall bladder wall thickness

	Wall Thickness		Total	P value*
	Thick, Moderate(>=4mm)	Normal(<4mm)		
Easy	7	28	35	<0.001
	20.0%	80.0%	100.0%	
Difficulty	18	7	25	
	72.0%	28.0%	100.0%	
Total	25	35	60	
	41.7%	58.3%	100.0%	

*Chi Square Test

Out of 60 patients, 35 patients had normal gall bladder wall thickness and 25 had increased (>=4mm, thick and moderate) gall bladder wall thickness. In increased GB wall thickness group 18 patients had difficult surgery and in normal wall thickness group 7 patients had difficult surgery. Here increased GB wall thickness is statistically significant with p value <0.001.

Table 2: Showing the patients' BMI distribution

	BMI			Total	P value
	<25	25- 27.5	>27.5		
Easy	25	1	9	35	0.012
	71.4%	2.9%	25.7%	100.0%	
Difficulty	11	7	7	25	
	44.0%	28.0%	28.0%	100.0%	
Total	36	8	16	60	
	60.0%	13.3%	26.7%	100.0%	

*Chi Square Test

Out of 60 patients, 36 patients had normal BMI, in them, 11 patients had difficult surgery. 8 patients had BMI >25-<27.5, among them 7 patients had difficult surgery and 16 patients had >27.5 BMI, in them 7 patients had difficult surgery. BMI is statistically significant with p value 0.012.

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Table 3: Showing the patients who had pre-operative ERCP

	Pre Op ERCP		Total	P value*
	Yes	No		
Easy	4	31	35	0.1016
	11%	89%	100.0%	
Difficulty	8	17	25	
	32%	68%	100.0%	
Total	12	48	60	
	20%	80%	100.0%	

*Chi Square Test

Out of 60 patients 12 patients underwent pre-operative ERCP, of which 4 patients had difficult surgery. Pre-operative ERCP is not statistically significant with p value 0.1016.

Table 4: The Score

	Score		Total
	<=4	>4	
Easy	24	11	35
	68.6%	31.4%	100.0%
	96.0%	31.4%	58.3%
Difficulty	1	24	25
	4.0%	96.0%	100.0%
	4.0%	68.6%	41.7%
Total	25	35	60
	41.7%	58.3%	100.0%
	100.0%	100.0%	100.0%

Out of 60 patients, 25 had total score <=4 and 35 patients had total score >=5.Out of 25 patients with score <=4, 24 patients had easy surgery and 1 had difficult surgery.
Out 35 patients with score >=5, 11 had easy surgery and 24 had difficult surgery. This study has got Sensitivity=96.0%, Specificity=68.6%, PPV=68.6%, NPV=96.0%, Accuracy=80.0%.

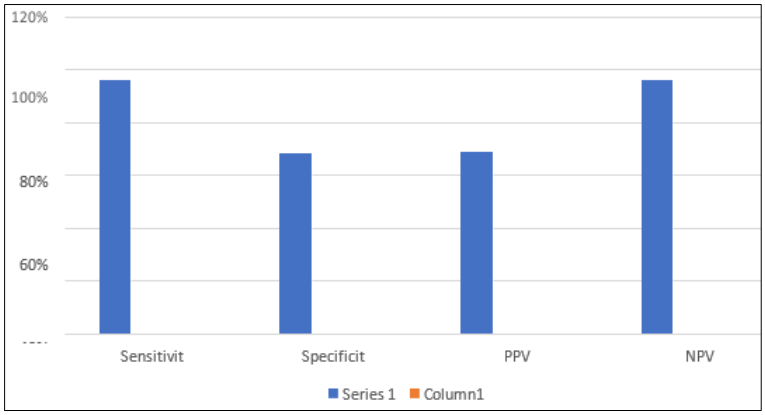

Fig 1: Sensitivity, specificity, PPV, NPV

Out of 60 patients, 3 patients underwent open conversion from LC. In that all three were male patients. Conversion rate is 5%.

Table 5: Conversion rate

Gender	Total No.	Open conversion
Male	20	3
Female	40	0
Total	60	**3**

Discussion

Age

Majority of the patients in the present series were in the age group of 40 -49 years of age, the age of our patients ranged from 18 to 71years. The similar age group has been mentioned in the study of Randhawa JS *et al.* [5] as the mean age in their patients varied from 9 to 70 years and the mean was 44.37 years. A

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study conducted by Sandhu G *et al.* [6] also had mean age of population studied 44.3 years. Which are comparable to our study.

Age wise distribution of difficulty

In our study >50 years age group had difficult surgery with significant p value 0.0232Similar results were seen in studies done by Randhawa *et al.* [5] and age >50 years had difficult surgery but those studies had non-significant p values.

Gender wise distribution of difficulty

In our study there was statistically significant difficulty between male and female patients with p value 0.0041. Similar results were seen in studies done by Vivek MK *et al.* with a statistically significant p value.

Previous history of Gall bladder disease symptoms

In our study previous history of Gall bladder disease symptoms was not statistically significant to predict difficulty with p value 0.324. Similar results were seen in studies by Younis KK *et al.* [7] (p value 0.720). But Studies done by Acharya A *et al.* [8] and Husain A *et al.* [9] showed statistically significant association for difficulty with p values 0.001 and <0.05 respectively. However in our study, out of 25 patients who had difficult surgery, 20 had GB symptoms (80%). It shows that surgery will be difficult in patients with previous history of GB disease symptoms.

Admission with Acute cholecystitis

In our study admission with acute cholecystitis was statistically significant to predict difficulty with p value 0.001. Similar results were seen in studies done by Acharya A *et al.*8 (p value 0.001), and Sultan AM *et al.* [10] (p value 0.001).

Past abdominal surgery

In our study past abdominal surgery is not statistically significant to predict difficulty with p value 0.693. Similar results were seen in studies done by Randhawa JS *et al.* [5] with p value 0.882 and Nikhil Gupta, *et al.*1 with p value 0.473.

Impacted stone in neck of GB

In our study impacted stone in neck of GB was statistically non-significant with p value 0.1797. Similar results were seen in studies done by patil S *et al.*, Randawa JS *et al.* with statistically non-significant p value.

Gall bladder wall thickness

In our study increased GB wall thickness (>4mm) showed statistically significant to predict difficulty with p value <0.01. Similar results were seen with studies done by Acharya *et al.* [8] with p value <0.038, Husain A *et al.* [9] with p value <0.05, Nikhil Gupta *et al.* study1 also showed statistically significant association between increased GB wall thickness and difficulty with p value <0.005.

BMI

In our study BMI >27.5 showed statistically significant to predict difficulty with p value 0.012. Other studies which had similar result are J S Randhawa *et al.* [5] with p value 0.010. A study done by Husain A *et al.* [9] showed there is significant association between BMI >30 and difficult surgery.

Sensitivity, Specificity, PPV, NPV, Accuracy

In our study the results were Sensitivity=96%, Specificity=68, 67%, PPV=68.6%, NPV=96.0%. This is for the score <=4 and >=5 to predict easy and difficult respectively. Similar results were seen in studies done by Nikhil Gupta *et al.* with Sensitivity and specificity of the scoring system at score 5 for prediction of easy or difficult laparoscopic cholecystectomy were 95.74% and 73.68% respectively.

Conclusion

In our study we found that male patients, Age >50 years, H/o Acute cholecystitis, Diabetes Mellitus, total WBC count > 18000 cells/cumm, GB wall thickness >4mm, BMI>27.5 statistically significant factors to predict difficult LC.

We may conclude that the scoring system evaluated in our study is a reliable and useful benchmark to predict difficult cases. However, the small sample size may be an impediment in attaining complete statistical validity. We propose large scale, multicentric studies to validate the scoring methodology and establish its efficacy.

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