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A Preoperative Prediction of Difficult Laparoscopic Cholecystectomy Using A Scoring System

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Abstract
Aim: *To predict preoperatively the difficult laparoscopic cholecystectomy using a scoring system-Rhandhawa and Pujahari.*
Methods : *From November 2018 to October 2020, a prospective study of the cases admitted to Department of General Surgery in GMK Medical College & Hospital Salem, planned for laparoscopic cholecystectomies were recruited. Preoperatively a score was given according to Rhandhawa and Pujahari scoring system. That includes history, clinical and sonological findings. Intraoperative score was given based on time taken for surgery, bile/stone spillage, injury cystic duct/ cystic artery and conversion to open cholecystectomy.*
Results: *The mean age of the participants is 48.5 years (S.D=12.5 years). The mean duration of surgery was 59.1 minutes (S.D=25.2 minutes. Around 14% (n=7) had history of hospitalisation. None of them had palpable gallbladder. Around 48% had abdominal scar . In Sonography, wall thickness <4mm was seen in 88% (n=44) while 12% (n=6) had thickness >4mm. Impacted stones was present in only one case. Pericholecystic collection was seen in 12% of cases (n=6). There was not much difference between preoperative and post-operative grading with p-value >0.05. There was 94% (n=47) correlation. The comparison of the findings between the present study and the study conducted by Randhawa and Pujahari showed similar statistical significance (p-value) set at 0.05. Previous history of hospitalization for cholecystitis and increased gall bladder wall thickness was found statistically significant in predicting difficult LC.*
Conclusion: *The present study showed that patients with multiple episodes of hospitalisation (from cholecystitis) had higher difficulty level. Presence of an abdominal scar indicates previous surgeries and may pose difficulty in surgery due to adhesions.Previous history of hospitalization for cholecystitis and increased gall bladder wall thickness was found statistically significant in predicting difficult LC. This scoring system is a good test for pre-operative predicting the difficulty of LC.*
Key word*: laparoscopic cholecystectomy, scoring system, prospective study*

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I. Introduction

Human beings have been affected by gall stone disease since time immemorial. For surgical removal of diseased gall bladder, laparoscopic cholecystectomy is the gold standard treatment[1]. It has distinct advantages though it has its own drawbacks. These complications are either that are common for laparoscopic surgeries or are that are unique to cholecystectomy. An estimated 2-15% require conversion from laparoscopic to open surgery due to different reasons[2,3]. The advantages include minimally invasive procedure, minimal pain, minimal scar and early return to full activity. Difficult laparoscopic cholecystectomy includes time taken for surgery, bile/stone spillage, injury to cystic duct/ cystic artery and conversion to open cholecystectomy. This study aimed to predict preoperatively the difficult laparoscopic cholecystectomy using a scoring system (Rhandhawa and Pujahari) [4].

II. Materials And Method

Aim AND OBJECTIVE:
To predict preoperatively the difficult laparoscopic cholecystectomy using a scoring system-Rhandhawa and Pujahari.
STUDY AREA :
Government Mohan Kumaramangalam Medical College And hospital [GMKMCH] .
Study population:

- From November 2018 to October 2020, a prospective study of the cases admitted to Department of General Surgery in GMK Medical College & Hospital Salem, planned for laparoscopic cholecystectomies were recruited

INCLUSION CRITERIA:
All patients undergoing laparoscopic cholecystectomy
EXCLUSION CRITERIA:
Patients not willing for surgery
STUDY PERIOD:
From November 2018 to October 2020
SAMPLE SIZE:
patients undergoing laparoscopic cholecystectomy
STUDY DESIGN:
A Prospective study is to be conducted on patients admitted in GMKMCH for laparoscopic cholecystectomy
Informed consent will be taken from each respondent.

III. Methods

Preoperatively a score was given according to Rhandhawa and Pujahari scoring system. That includes history, clinical and sonological findings. Intraoperative score was given based on time taken for surgery, bile/stone spillage, injury cystic duct/ cystic artery and conversion to open cholecystectomy (Figure 1 and 2). Postoperatively the cases were graded as easy, difficult and very difficult. The grading was correlated. Surgery was performed using carbon dioxide pneumoperitoneum with 10 mmHg pressure and using standard two 5 mm ports and two 10 mm ports. The timing between the first port site incision and the closure of last port closure was noted. Standard antibiotic treatment and post-operative care was provided with a clear documentation of the intraoperative events. The study was approved by the IEC of the tertiary care center.

History			Max score
Age	< 50 (0)	>50 (1)	1
Sex	Female (0)	Male (1)	1
H/o hospitalization	No (0)	Yes (4)	1
Clinical			
BMI	<25	>25-27.5 (1) >27.5 (2)	2
Palpable GB	No (0)	Yes (1)	1
Abdominal scar	No (0)	Infraumbilical (1) Supraumbilical (2)	2
Sonography			
Wall thickness	Thin (0)	Thick >4 mm (2)	2
Impacted stones	No (0)	Yes (1)	1
Pericholecystic collection	No (0)	Yes (1)	1

Figure 1: Randhawa and Pujahari Scoring System

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

Figure 2: Easy/difficult criteria

IV. Results

The mean age of the participants is 48.5 years (S.D=12.5 years). The mean duration of surgery was 59.1 minutes (S.D=25.2 minutes). Table 1 shows the history of the participants. Around 54% (n=27) were <50 years old and 46% (n=23) were >50 years old. Around 72% (n=36) were males while 28% (n=14) were females. Around 14% (n=7) had history of hospitalisation. BMI was less than 25 in 46% (n=23), between 25 and 27.5 in

30% (n=15) and >27.5 in 24% (n=12). None of them had palpable gallbladder. Around 48% had abdominal scar (Infraumblical=40%; Supraumblical=8%). In Sonography, wall thickness <4mm was seen in 88% (n=44) while 12% (n=6) had thickness >4mm. Impacted stones was present in only one case. Pericholecystic collection was seen in 12% of cases (n=6). Table 2 shows the clinical features and table 3 shows the ultrasound findings. Preoperative grading was easy in 82% (n=41), 12% (n=6) and 6% (n=3) [Table 4]. Intraoperative findings show that there was only one case of bile leak/stone spillage [Table 5]. Post-operative findings how that 76% (n=38) cases were easy, 18% (n=9) were difficult and 6% (n=3) were very difficult. There was not much difference between preoperative and post-operative grading (Table 7) with p-value >0.05. There was 94% (n=47) correlation (Table 8). Table 9 shows the comparison of the findings between the present study and the study conducted by Randhawa and Pujahari. The findings are similar and showed similar statistical significance (p-value) set at 0.05.

S.No	Parameter	Categories	Frequency (Percentage)
	History		
1	Age (years)	<50	27 (54%)
		>50	23 (46%)
2	Sex	Female	36 (72%)
		Male	14 (28%)
3	History of hospitalisation	Yes	7 (14%)
		No	43 (86%)

Table 1: History of the participants

S.No	Clinical	Categories	Frequency (Percentage)
1	BMI	<25	23 (46%)
		>25-27.5	15 (30%)
		>27.5	12 (24%)
2	Palpable gall bladder	Yes	-
		No	50 (100%)
3	Abdominal Scar	No	26 (52%)
		Infraumblical	20 (40%)
		Supraumblical	4 (8%)

Table 2: Clinical Features

S.No	Sonography	Categories	Frequency (Percentage)
1	Wall thickness	<4mm	44 (88%)
		>4mm	6 (12%)
2	Impacted stones	No	49 (98%)
		Yes	1 (2%)
3	Pericholecystic collection	No	44 (88%)
		Yes	6 (12%)

Table 3: Sonography findings

S.No	Categories	Frequency	Percentage
1	Easy	41	82
2	Difficult	6	12
3	Very Difficult	3	6

Table 4: Preoperative grading

S.No	Intraoperative findings	Frequency	Percentage
1	Bile leak/ Stone spillage	1	2
2	Injury	0	0
3	Open Conversion	0	0

Table 5: Intraoperative findings

S.No	Categories	Frequency	Percentage
1	Easy	38	76
2	Difficult	9	18
3	Very Difficult	3	6

Table 6: Postoperative grading

		Post-operative grading			Total	Chi-square test p-value
		Difficult	Easy	Very difficult		
Pre-operative grading	Difficult	6	0	0	6	P>0.05
	Easy	3	38	0	41	
	Very	0	0	3	3	

	difficult					
Total		9	38	3	50	

Table 7: Cross tabulation between preoperative and post-operative grading

S.No	Correlation	Frequency	Percentage
1	Yes	47	94
2	No	3	6

Table 8: Correlation between preoperative and post-operative grading

S.No	Parameter	Categories	Preoperative Grading (Frequency)		Total Frequency (Percentage)	Current Study	Randhawa and Pujahari
			Difficult	Easy		p-value	p-value
1	Age (years)	<50	-	27	27 (54%)	0.612	0.937
		>50	9	14	23 (46%)		
2	Sex	Female	5	31	36 (72%)	0.376	0.736
		Male	4	10	14 (28%)		
3	H/o hospitalisation	Yes	2	41	7 (14%)	0.003	0.001
		No	7	0	43 (86%)		
4	BMI	<25	1	22	23 (46%)	0.023	0.010
		>25-27.5	1	14	15 (30%)		
		>27.5	7	5	12 (24%)		
5	Palpable gall bladder	Yes	-	-	-	0.01	0.022
		No	9	41	50 (100%)		
6	Wall thickness	<4mm	4	40	44 (88%)	0.042	0.038
		>4mm	5	1	6 (12%)		
7	Impacted stones	No	9	40	49 (98%)	0.76	0.190
		Yes	-	1	1 (2%)		
8	Pericholecystic collection	No	6	38	44 (88%)	0.34	0.999
		Yes	3	3	6 (12%)		

Table 9: Comparison of the findings between the current study and the Randhawa & Pujahari Study

V. Discussion

Literature shows that in difficult gall bladder surgery, age is a risk factor[5]. The present study though did not show much statistical significance. This can be attributed to the small sample size of the study and the study being done in a single center. Male sex is associated with higher morbidity[6]. But the present study has the bias of recruiting more male patients where this particular risk factor cannot be assessed correctly. BMI is an important factor where obesity is a significant threat to the surgery in terms of duration and outcome. Obesity affects the access to the abdomen and the dissection of fatty calot[7]. The present study showed similar findings where higher BMI was associated with increased severity.

The present study showed that patients with multiple episodes of hospitalisation (from cholecystitis) had higher difficulty level. Repeated hospitalisations may cause thickness of the gall bladder wall with subsequent scarring and fibrosis[8]. Similarly palpable gall bladder and gall bladder wall thickness was significant predictors of intraoperative difficulty ($p<0.05$)[9].

Presence of an abdominal scar indicates previous surgeries and may pose difficulty in surgery due to adhesions. However, it was not significant enough in the present and in the existing literature[10]. Previous history of hospitalization for cholecystitis and increased gall bladder wall thickness was found statistically significant in predicting difficult LC. This scoring system is a good test for pre-operative predicting the difficulty of LC. However, large scale multi centric studies are required to validate the scoring system.

VI. Conclusion

Randhawa & Pujahari scoring system is a good test for pre-operative predicting the difficulty of LC. However, large scale multi centric studies are required to validate the scoring system.

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