

Evaluation of preoperative predictive factors for difficult laparoscopic cholecystectomy in comparison with intraoperative parameters

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Objective

The aim was to assess the preoperative predictive factors that determine difficult laparoscopic cholecystectomy (LC) in comparison with intraoperative parameters and outcome.

Patients and methods

This prospective study include 100 patients having symptomatic cholelithiasis. All patients underwent elective LC in Department of General Surgery in Aswan University Hospital. The collected data include the parameters of preoperative scoring system, which were male sex, old age, history of hospitalization, obesity (BMI), abdominal scar, palpable gallbladder (GB), wall thickness of GB, pericholecystic collection, and impacted stone. The difficulty levels according to preoperative score were easy (0–5), difficult (6–10), and very difficult (11–15). Various intraoperative parameters were faced while doing LC that were considered for intraoperative scoring system, which categorizes the patients into easy, difficult, and very difficult surgical procedure on the basis of time taken in minutes, bile/stone spillage, injury to duct, and conversion to open cholecystectomy.

Results

In this study, previous history of hospitalization ($P=0.001$ and 0.01) and wall thickness ($P=0.007$ and 0.02) were found to be statistically significant in predicting difficult LC in both univariate and multivariate analyses. Other factors such as age ($P=0.002$), BMI greater than 27.5 ($P=0.02$), palpable GB ($P=0.003$), and impacted stone ($P=0.01$) were found to be statistically significant in univariate analysis in predicting difficult LC. Remaining factors such as sex, abdominal scar, and pericholecystic collection were not found to be statistically significant in predicting difficult LC. Receiver operating characteristic curve for prediction of intraoperative outcome based on preoperative score for difficult/very difficult versus easy cases at cutoff point greater than 5 and area under the curve of 0.86, with 95% confidence interval=0.77–0.92, showed sensitivity of 74.3, specificity of 96.9, positive predictive value of 92.9, negative predictive value of 87.5, and accuracy of 85.6.

Conclusion

We concluded that the preoperative scoring system is statistically and clinically a good test for predicting the operative outcome in LC.

Keywords:

intraoperative scoring system, laparoscopic cholecystectomy, preoperative scoring system

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Introduction

Cholelithiasis is the most common biliary disease [1]. Gallstones are present in 10–15% of the general populations and are asymptomatic in most of them (>80%); moreover, the prevalence of gallstones varies widely in different parts of the world [2]. Approximately 1–2% of asymptomatic patients will develop symptoms requiring cholecystectomy per year, making cholecystectomy the most common operations performed by general surgeons [3]. Laparoscopic cholecystectomy (LC) has become the procedure of choice for management of symptomatic gall stone disease [4]. In LC, the surgeons encountered difficulty when there were acutely inflamed or

gangrenous gallbladder (GB), dense adhesions at Calot's triangle, fibrotic and contracted GB, cholecystoenteric fistula, etc. [5]. There are many risk factors that make laparoscopic surgery difficult like male sex, old age, obesity, attacks of acute cholecystitis, previous abdominal surgery, and certain ultrasonographic findings, that is, thickened GB wall, distended GB, pericholecystic fluid collection, and impacted stone. [6]. Another similar study by Lee *et al.* [7] found that the risk factors for

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conversion included age greater than 65 years, male sex, patients with previous upper abdominal surgery, and those with documented history of acute cholecystitis. Ultrasonography is the most common noninvasive, safe, and highly accurate screening test for cholecystitis and cholelithiasis, and it can also help surgeons to get an idea of potential difficulty to be faced during surgery in that particular patient [8]. The objective of this study was to evaluate the preoperative predictive factors that determine difficult LC (preoperative scoring system) in comparison with intraoperative parameters (intraoperative scoring factors) and outcome.

Patients and methods

The present prospective study was conducted on 100 patients of both sex having symptomatic cholelithiasis and aged between 19 and 70 years (with exclusion of patients with acute cholecystitis, empyema of GB, CBD stones, jaundice or abnormal liver function tests, peritonitis, acute pancreatitis, cholangitis, morbid obesity, with pregnancy, portal hypertension, GB carcinoma, biliary enteric fistula, and patients who had any contraindication to laparoscopic surgery). All patients were admitted to the department of general surgery in Aswan University Hospital, Egypt, in the period from 1 January 2015 to 30 December 2017. All patients underwent elective LC by experienced laparoscopic surgeons. Ethical approval was taken from the concerned institutional committee for the commencement of the study. Informed written consent was taken from all patients. Data were collected by us and our residents. Diagnosis of symptomatic cholelithiasis was made based on history, clinical examination, laboratory, and radiological investigations. The preoperative predictive factors of difficult LC (preoperative scoring system by Randhawa and Pujahari [9]) included the following: (a) history: age, sex, and history of hospitalization for acute cholecystitis; (b) clinical data: BMI=weight(kg)/height (m²), abdominal scar, and palpable GB; and (c) sonographic data: wall thickness of GB, pericholecystic collection, and impacted stone, as shown in Tables 1 and 2. Moreover, various intraoperative parameters were faced while doing LC, which were used for categorization and grading of difficult level of LC as defined by Randhawa and Pujahari [9], as shown in Table 3.

The scores were compared in each patient to conclude whether preoperative predictive score was a useful method or not for prediction of intraoperative outcome. The operation was done by using CO₂ gas for pneumoperitoneum with 12 mmHg pressure. Two 10-mm and two 5-mm ports were used. The time of

Table 1 Preoperative predictive factors of difficult laparoscopic cholecystectomy (preoperative scoring system)

History	Maximum scores	
Age (years)		
≤50	0	1
>50	1	
Sex		
Female	0	1
Male	1	
History of hospitalization		
No	0	4
Yes	4	
Clinical		
BMI=weight (kg)/height (m ²)		
<25	0	2
25–27.5	1	
>27.5	2	
Abdominal scar		
No	0	2
Infraumbilical	1	
Supraumbilical	2	
Palpable gallbladder		
No	0	1
Yes	1	
Sonography		
Wall thickness		
Thin (< 4 mm)	0	2
Thick (≥4 mm)	2	
Pericholecystic collection		
No	0	1
Yes	1	
Impacted stone		
No	0	1
Yes	1	
Total maximum scoring		15

Table 2 Preoperative prediction of difficulty levels according to scoring system

Scores	Difficulty level
0–5	Easy
6–10	Difficult
11–15	Very difficult

Table 3 Intraoperative scoring factors and difficulty levels

Intraoperative parameters	Scores	Grading
Time taken <60 min; no bile spillage; no injury to duct or artery	0–5	Easy
Time taken 60–120 min and/or bile or stone spillage and/or injury to duct	6–10	Difficult
Time taken >120 min or conversion	11–15	Very difficult

operation was calculated from the first port site insertion till last port site closure.

Statistical analysis

Data were analyzed using STATA intercooled version 14.2. Quantitative data were represented as mean, SD,

median, and range. Qualitative data were presented as number. Univariate and multivariate logistic regression analyses were done to predict difficulty. ROC curve analysis was used to estimate difficulty. Graphs were produced by using Excel or STATA program. *P* value was considered significant if it was less than 0.05.

Results

A total of 100 patients were included in this study; the majority of them were females [*N*=84 (84%)]. The patient characteristics are presented in Table 4.

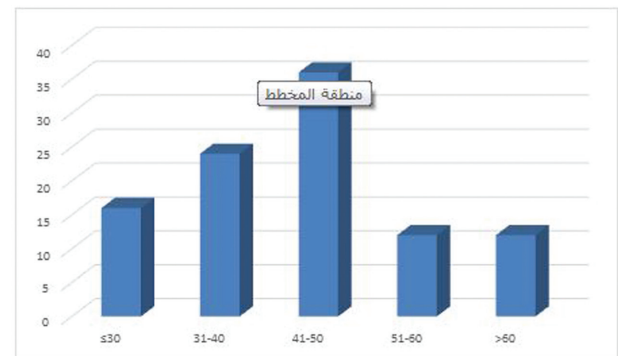
In our study, the mean age was 43.92 years (range: 19–70 years). Most patients were in the age group of 41–50 years followed by age group of 31–40, as shown

Table 4 Patients characteristics and distribution of parameters

Items	Summary statistics [n (%)]
Age (years)	
Mean±SD	43.92±12.66
Median (range)	43 (19–70)
Age	
≤50	76 (76.00)
>50	24 (24.00)
Sex	
Female	84 (84.00)
Male	16 (16.00)
History of hospitalization for acute cholecystitis	
No	72 (72.00)
Yes	28 (28.00)
BMI	
<25	68 (68.00)
25–27.5	8 (8.00)
>27.5	24 (24.00)
Abdominal scar	
No	64 (64.00)
Infraumbilical	24 (24.00)
Supraumbilical	12 (12.00)
Palpable gallbladder	
No	72 (72.00)
Yes	28 (28.00)
Wall thickness	
Thin (<4 mm)	79 (79.00)
Thick (≥4 mm)	21 (21.00)
Pericholecystic collection	
No	81 (81.00)
Yes	19 (19.00)
Impacted stone	
No	72 (72.00)
Yes	28 (28.00)
Conversion	
No	88 (88.00)
Yes	12 (12.00)
Number of stone	
Solitary calculi	24 (24.00)
Multiple calculi	76 (76.00)

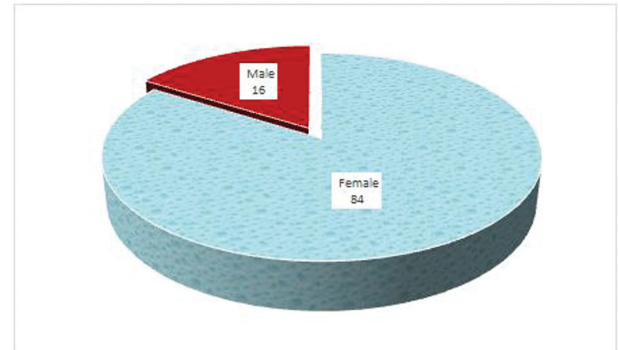
in Table 4 and Fig. 1. Of 100 patients, 84 were female and 16 were male patients, with female to male ratio of 5.25 : 1, as shown in Table 4 and Fig. 2. Regarding ultrasonography findings, 76 patients had multiple stones, whereas 24 patients had solitary stone; moreover, 28 patients had impacted stone, 21 patients had wall thickness greater than or equal to 4 mm, and pericholecystic collection was present in 19 patients, as shown in Table 4 and Fig. 3.

Figure 1



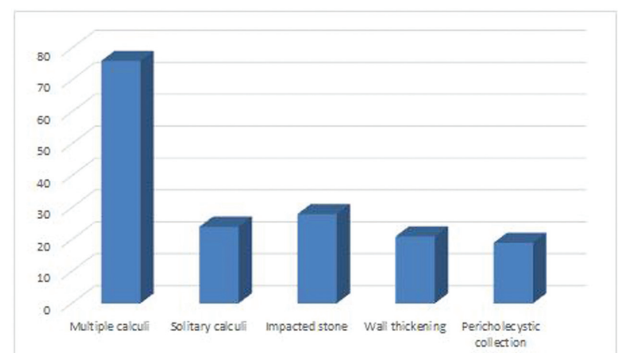
Age distribution of cholelithiasis.

Figure 2



Sex distribution of cholelithiasis.

Figure 3



Ultrasonography findings.

The relation between the prediction of difficulty level of the cases preoperatively and the actual outcome of the cases is shown in Table 5.

On preoperative evaluation, the number of cases predicted to be difficult/very difficult were 28 (28%) patients, and 26 (26%) of them were difficult/very difficult on surgery, whereas two (2%) patients turned out to be easy on surgery. However, the cases predicted to be easy on preoperative evaluation were 72 (72%) patients, of which 63 (63%) patients were actually easy, whereas nine (9%) patients turned out to be difficult/very difficult on surgery, as shown in Table 6.

Seven (7%) patients were converted to open cholecystectomy from 28 (28%) patients found to be difficult/very difficult on preoperative evaluation. Moreover, five (5%) cases were converted to open from 72 patients found to be easy on preoperative evaluation, as shown in Table 7. So in our study, there were 12 (12%) conversions, eight cases of them were male and four cases were female. These conversions were owing to dense adhesions at Calot's triangle (eight cases), Mirrizi's syndrome (two cases), and uncontrolled bleeding (two cases), as shown in Table 7.

Regarding comparison between preoperative evaluation and intraoperative finding, the χ^2 -value came out to be 57.22 (>18.467), which is highly significant, as shown in Table 8.

Regarding both univariate and multivariate analyses of preoperative outcome with risk factors,

Table 5 Correlation between preoperative score and the outcome

Preoperative scores	Easy	Difficult	Very difficult	Total
0-5	63	6	3	72
6-10	2	21	5	28
Total	65	27	8	100

Table 6 Comparison of preoperative evaluation with difficulty in performing laparoscopic cholecystectomy

	Intraoperatively difficult/very difficult cases [n (%)]	Intraoperatively easy cases [n (%)]	Total
Preoperatively difficult/very difficult cases	26 (26.00)	2 (2.00)	28 (28.00)
Preoperatively easy cases	9 (9.00)	63 (63.00)	72 (72.00)
Total	35 (35.00)	65 (65.00)	100 (100)

previous history of hospitalization for acute cholecystitis and wall thickness were found to be statistically significant in predicting difficult LC, whereas other factors such as age, BMI greater than 27.5, palpable GB, and impacted stone were found to be statistically significant in univariate analysis in predicting difficult LC, as shown in Table 9.

Regarding both univariate and multivariate analyses of intraoperative outcome with risk factors, previous history of hospitalization and wall thickness were found to be statistically significant in predicting difficult LC, whereas other factors such as age, sex, palpable GB, and impacted stone were found to be statistically significant in univariate analysis in predicting difficult LC, as shown in Table 10.

Receiver operating characteristic (ROC) curve for prediction of intraoperative outcome based on

Table 7 Comparison of preoperative evaluation with conversion to open procedure

	Number of cases converted to open procedure [n (%)]	Number of cases not required to be converted to open procedure [n (%)]	Total
Number of cases predict to be difficult/very difficult on preoperative evaluation	7 (7.00)	21 (21.00)	28 (28.00)
Number of cases predict to be easy on preoperative evaluation	5 (5.00)	67 (67.00)	72 (72.00)
Total	12 (12.00)	88 (88.00)	100 (100)

Table 8 Comparison between preoperative evaluation and intraoperative findings

	Number of cases easy on surgery [n (%)]	Number of cases difficult/very difficult on surgery [n (%)]	χ^2	P value
Number of cases easy on preoperative evaluation	63 (63.00)	9 (9.00)	57.22	<0.0001
Number of cases difficult/very difficult on preoperative evaluation	2 (2.00)	26 (26.00)		

Table 9 Univariate and multivariate analyses of preoperative outcome with risk factors (predictive association of risk factors with preoperative outcome)

Risk factors	Preoperative outcome [n (%)]		Unadjusted odds ratio (95% confidence interval) (univariate)	P value	Adjusted odds ratio (95% confidence interval) (multivariate)	P value
	Easy (N=72)	Difficult (N=28)				
Age						
≤50	61 (84.72)	15 (53.57)	Reference	0.002	Reference	0.22
>50	11 (15.28)	13 (46.43)	4.81 (1.80–12.82)		2.97 (0.52–16.76)	
Sex						
Female	62 (86.11)	20 (78.57)	Reference	0.36	Reference	0.33
Male	10 (13.89)	6 (21.43)	1.69 (0.55–5.20)		2.72 (0.36–20.34)	
History of hospitalization for acute cholecystitis						
No	59 (81.94)	13 (46.43)	Reference	0.001	Reference	0.01
Yes	13 (18.06)	15 (53.57)	5.23 (2.01–13.60)		11.14 (1.79–69.19)	
BMI						
<25	54 (75.00)	14 (50.00)	Reference	0.29	Reference	0.40
25–27.5	5 (6.94)	3 (10.71)	2.31 (0.49–10.87)	0.02	2.68 (0.27–27.04)	0.24
>27.5	13 (18.06)	11 (39.29)	3.26 (1.20–8.83)		2.23 (0.58–8.61)	
Abdominal scar						
No	48 (66.67)	16 (57.14)	Reference	1.00	Reference	0.21
Infraumbilical	18 (25.00)	6 (21.43)	1.00 (0.33–2.95)	0.09	2.91 (0.54–15.62)	0.93
Spraumbilical	6 (8.33)	6 (21.43)	3.00 (0.85–10.63)		1.12 (0.10–12.65)	
Palpable gallbladder						
No	58 (80.56)	14 (50.00)	Reference	0.003	Reference	0.46
Yes	14 (19.44)	14 (50.00)	4.14 (1.61–10.64)		0.53 (0.11–2.43)	
Wall thickness						
Thin (<4 mm)	62 (86.11)	17 (60.71)	Reference	0.007	Reference	0.02
Thick (≥4 mm)	10 (13.89)	11 (39.29)	4.01 (1.46–11.02)		7.37 (1.32–41.25)	
Pericholecystic collection						
No	58 (80.56)	23 (82.14)	Reference	0.86	Reference	0.49
Yes	14 (19.44)	5 (17.86)	0.90 (0.29–2.79)		0.50 (0.06–3.81)	
Impacted stone						
No	57 (79.17)	15 (53.57)	Reference	0.01	Reference	0.34
Yes	15 (20.83)	13 (46.43)	3.29 (1.29–8.39)		2.02 (0.47–8.64)	

preoperative score for difficult/very difficult versus easy cases at cutoff point greater than 5 and area under the curve (AUC) of 0.86, with 95% confidence interval (CI)=0.77–0.92, showed sensitivity of 74.3, specificity 96.9, positive predictive value (PPV) 92.9, negative predictive value (NPV) 87.5, and accuracy 85.6, as shown in Table 11 and Fig. 4. Moreover, ROC curve for difficult versus easy cases at cutoff point greater than 5 and AUC of 0.91, with 95% CI=0.83–0.96, showed sensitivity of 77.8, specificity 96.9, PPV 91.3, NPV 91.3, and accuracy 87.35, as shown in Table 11 and Fig. 5. Moreover, ROC curve for very difficult versus difficult cases at cutoff point greater than 8 and AUC of 0.57, with 95%CI=0.39–0.74, showed sensitivity of 50.0, specificity of 88.9, PPV of 57.1, NPV of 85.7, and accuracy of 69.45, as shown in Table 11 and Fig. 6. So from these results, we observed that the preoperative scoring system is statistically and

clinically a good test for predicting the intraoperative outcome in LC.

Discussion

LC, which is the treatment of choice for symptomatic gallstones, can be difficult in distorted anatomy owing to dense adhesions in Calot's triangle, empyema of GB, contracted GB, Mirrizi's syndrome, previous upper abdominal operations, and acute cholecystitis [10].

Old age (age: >50 years) has been found to be a significant risk factor for difficult LC in many studies [11]. Age is a risk factor for difficult GB surgery [12]. In our study, we found significant correlation between age greater than 50 years and the difficult level of surgery in univariate analysis in both preoperative and intraoperative outcomes ($P=0.002$ and 0.001 , respectively).

Table 10 Univariate and multivariate analyses of intraoperative outcome with risk factors (predictive association of risk factors with intraoperative outcome)

Risk factors	Intraoperative outcome [n (%)]		Unadjusted odds ratio (95% confidence interval)	P value	Adjusted odds ratio (95% confidence interval)	P value
	Easy (N=65)	Difficult (N=27)				
Age						
≤50	55 (84.62)	13 (48.15)	Reference	0.001	Reference	0.55
>50	10 (15.38)	14 (51.85)	5.92 (2.15–16.29)		1.75 (0.27–11.23)	
Sex						
Female	60 (92.31)	20 (74.07)	Reference	0.03	Reference	0.84
Male	5 (7.69)	7 (25.93)	4.2 (0.1.19–14.72)		0.78 (0.07–8.75)	
History of hospitalization for acute cholecystitis						
No	54 (83.08)	14 (51.85)	Reference	0.003	Reference	0.01
Yes	11 (16.92)	13 (48.15)	4.56 (1.68–12.33)		13.14 (1.77–97.66)	
BMI						
<25	48 (73.85)	16 (59.26)	Reference	0.15	Reference	0.25
25–27.5	4 (6.15)	4 (14.81)	3.00 (0.67–13.40)	0.38	5.02 (0.32–78.59)	0.55
>27.5	13 (20.00)	7 (25.93)	1.62 (0.55–4.75)		1.56 (0.0.36–6.73)	
Abdominal scar						
No	41 (63.08)	19 (70.37)	Reference	0.07	Reference	0.41
Infraumbilical	18 (27.69)	2 (7.41)	0.24 (0.05–1.14)	0.23	2.58 (0.27–24.01)	0.63
Spraumbilical	6 (9.23)	6 (22.22)	2.16 (0.61–7.57)		1.86 (0.15–22.85)	
Palpable gallbladder						
No	55 (84.62)	13 (48.15)	Reference	0.001	Reference	0.96
Yes	10 (15.38)	14 (51.85)	5.92 (2.15–16.29)		0.96 (0.22–4.24)	
Wall thickness						
Thin (<4 mm)	57 (87.69)	15 (55.56)	Reference	0.001	Reference	0.02
Thick (≥4 mm)	8 (12.31)	12 (44.44)	5.7 (1.97–16.45)		12.73 (1.60–101.02)	
Pericholecystic collection						
No	54 (83.08)	19 (70.37)	Reference	0.18	Reference	0.34
Yes	11 (16.92)	8 (29.63)	2.07 (0.72–5.91)		2.69 (0.35–20.66)	
Impacted stone						
No	54 (83.08)	14 (51.85)	Reference	0.003	Reference	0.07
Yes	11 (16.92)	13 (45.15)	4.56 (1.69–12.33)		3.81 (0.88–16.54)	

Table 11 Receiver operating characteristic curve and its area under curve for prediction of intraoperative outcome based on preoperative score

	Cut-off point	AUC (95%CI)	Sensitivity (%)	Specificity (%)	PPV (%)	NPP (%)	Accuracy (%)
Difficult/very difficult vs. easy	>5	0.86 (0.77–0.92)	74.30	96.9	92.9	87.5	85.60
Difficult vs. easy	>5	0.91 (0.83–0.96)	77.8	96.9	91.3	91.3	87.35
Very difficult vs. difficult	>8	0.57 (0.39–0.74)	50.0	88.9	57.1	85.7	69.45

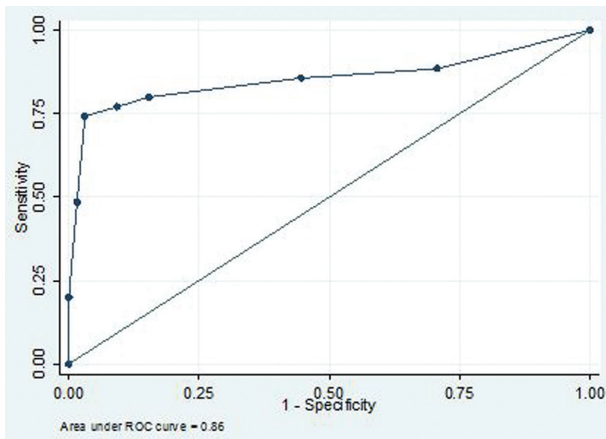
AUC, area under the curve; CI, confidence interval; NPV, negative predictive value; PPV, positive predictive value.

In studies done worldwide, male sex has been described to be associated with difficult LC [13]. Conversion rate and significantly higher mortality have been reported in male sex [14]. In the present study, there were 84 female and 16 male patients. Of 16 males, six (37.5%) were predicted to have a difficult surgery. After surgery, seven (43.75%) of them turned out to have a difficult procedure, four (25%) of them turned out to have a very difficult procedure, and eight (66.7%) of them were converted to open. So we found significant correlation between male sex and the difficult level of surgery in univariate analysis in intraoperative outcome ($P=0.03$).

The patients who require hospitalization for repeated attacks of acute cholecystitis carry more chances of difficult LC and conversion, probably owing to dense adhesions at Calot’s triangle and GB fossa [14]. In this study, it was found to be statistically significant for prediction of difficult LC in both univariate and multivariate analyses in preoperative and intraoperative outcomes with risk factors ($P=0.001$ and 0.01 ; and ($P=0.003$ and 0.01 , respectively).

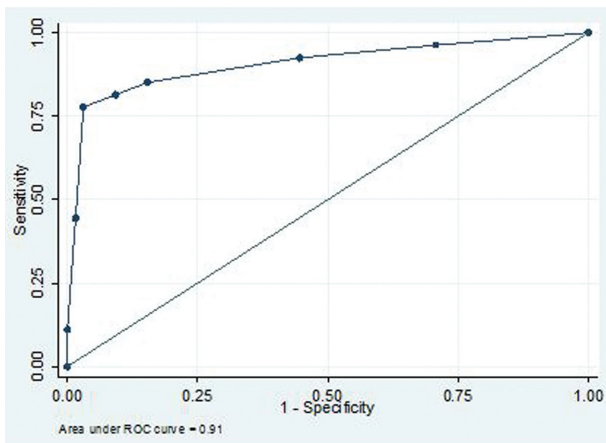
Regarding obesity, laparoscopic surgery is difficult owing to various factors, such as port placement in

Figure 4



Receiver operating characteristic curve and its area under curve for prediction of intraoperative outcome based on preoperative score (difficult/very difficult vs. easy).

Figure 5

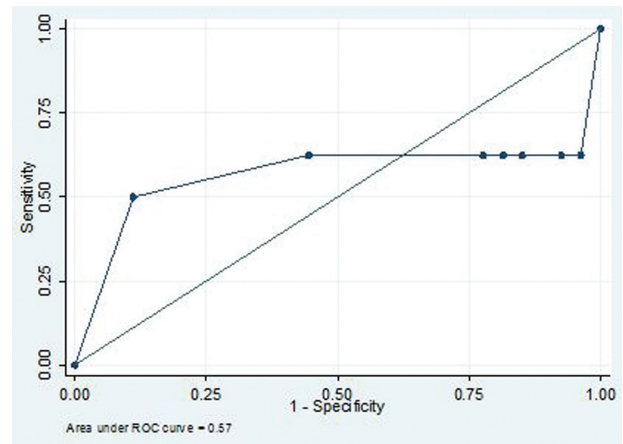


Receiver operating characteristic curve and its area under curve for prediction of intraoperative outcome based on preoperative score (difficult vs. easy).

obese patients takes longer time owing to the thick abdominal wall, dissection at the Calot's triangle is also technically difficult owing to the obscure anatomy because of excessive intraperitoneal fat, and there is difficulty in the manipulation of instruments through an excessively thick abdominal wall [15]. In our study, BMI greater than 27.5 was found to be a significant factor for prediction of difficult LC only in univariate analysis in preoperative outcome with risk factors ($P=0.02$).

Supra and infraumbilical scar, indication of previous abdominal operations, may lead to adhesions present between viscera or omentum and abdominal wall. There may be chances of injury to these structures during insertion of first port, and the risk of conversion was reported to be

Figure 6



Receiver operating characteristic curve and its area under curve for prediction of intraoperative outcome based on preoperative score (very difficult vs. difficult).

higher [16]. In the present study, abdominal scar was found to be statistically insignificant in both univariate and multivariate analyses of preoperative and intraoperative outcomes with risk factor.

Palpable GB was found to be predictor of difficult LC, clinically palpable GB may be due to distended GB, mucocele of GB, thick-walled or owing to adhesions between the GB and the omentum [10]. In our study, 28 patients had palpable GB, 14 of them had a difficult procedure after surgery. Palpable GB was found to be statistically significant in univariate analysis of preoperative and intraoperative outcomes with risk factor ($P=0.003$ and 0.001 , respectively).

Increased thickness of GB wall is associated with difficult dissection of the GB from its bed; thick GB wall may make grasping and manipulation of GB difficult, and this also makes the dissection at Calot's triangle and the GB bed to be difficult and limits the extent of anatomical definition [17]. In our study, we observed significant correlation between the GB wall thickness and the difficulty level of surgery in both univariate and multivariate analyses of preoperative and intraoperative outcomes with risk factor ($P=0.007$ and 0.02 , and $P=0.001$ and 0.02 , respectively). Pericholecystic collection was found to be a predictor of difficult LC [18]. Other studies found that pericholecystic collection was found to be insignificant factor in the difficulty level of LC [9]. In our study, we found no significant correlation between pericholecystic collection and the difficulty level of surgery in both univariate and multivariate analyses of preoperative and intraoperative outcomes.

Impacted stone at the neck of GB poses some technical problems in LC, because of distension of GB, with thick GB wall. It is difficult to grasp the GB neck to allow adequate retraction to perform dissection at Calot's triangle [8]. In this study, impacted stone at the neck of GB was found to be statistically significant in univariate analysis of preoperative and intraoperative outcomes with risk factor ($P=0.01$ and 0.003 , respectively).

Conversion rate reported in literature was between 7 and 35% [19]. Other researchers reported that, difficult cases are associated with a conversion rate of 25% [20]. In our study, the conversion rate was 12%, because of dense adhesions at Calot's triangle (eight cases=8%), Mirizzi's syndrome (two cases=2%), and uncontrolled bleeding (two cases=2%). Overall, eight patients of them were male whereas four patients were female.

From our study, we found that the number of cases predicted to be difficult/very difficult on preoperative evaluation were 28 (28%) patients, of which 26 (26%) were difficult/very difficult on surgery, whereas two (2%) cases were turned out to be easy, and also seven patients were converted to open. The cases predicted to be easy on preoperative evaluation were 72 (72%), of which 63 (63%) cases were actually easy whereas nine (9%) cases turned out to be difficult/very difficult on surgery, and also five cases were converted to open. The χ^2 was 57.22 (>18.467), which denotes the highly statistically significant ($P=0.0001$) relation between preoperative score and intraoperative score of LC patients, so the patient with easy preoperative score mostly will have easy intraoperative score as well.

Conclusion

Previous history of hospitalization for acute cholecystitis and wall thickness of GB (in both univariate and multivariate analysis), along with age, sex, BMI greater than 27.5, palpable GB, and impacted stone (in univariate analysis) were found to be statistically significant to predict difficult LC. However, there was no significant correlation between abdominal scar and pericholecystic collection with the difficulty level of surgery. We concluded that the preoperative scoring system is statistically and clinically a good test for predicting the operative outcome in LC.

Recommendation

Further multicenter and large scale studies are needed to validate the preoperative scoring system and establish its efficacy.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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