PREOPERATIVE PREDICTIVE RISK FACTORS OF DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY

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Introduction

Laparoscopic cholecystectomy (LC) is a common and minimally invasive surgical procedure for treating gallbladder (GB)-related disease. The difficulty of a laparoscopic cholecystectomy can be influenced by different factors, including male sex, advanced age, obesity, attacks of acute cholecystitis, impacted stones, previous abdominal surgery, specific ultrasonography findings such as thickened GB wall, distended GB, and pericholecystic fluid collection, as well as external factors like malfunction of inappropriate equipment. Preoperative prediction risk factors of difficult Laparoscopic cholecystectomy provide various potential benefits. However, The degree of difficulty is difficult to predict, but it is crucial to do so for the surgeon to be prepared to handle a challenging case and assemble a more experienced surgical team for the patients with high-risk factors of a difficult LC and for the patient to be informed about the possibility of conversion to open cholecystectomy.

Aim of the work

This study aims to determine and evaluate different predictive risk factors for Difficult Laparoscopic Cholecystectomy.

Patients and Methods

This prospective study was carried out on 51 patients over 18 years old and planned for Laparoscopic cholecystectomy. Preoperative data was recorded such as Patient's characteristics, past history, preoperative laboratory tests and US findings. Different intraoperative findings were recorded and LC was classified into easy, difficult and very difficult according to the grading system described by Randhawa and Puja Hari.

Results

Both Univariate and multivariate analysis revealed that being male, having a BMI >27.5 kg/m^{2,} , Previous attacks increase the risk of having difficult LC. Univariate analysis found that adhesion and Calot's triangle dissection difficulty increases the risk of having difficulty by 3.50-fold and 17.333-fold respectively, however these were not significant in a multivariate analysis. The multivariate regression analysis revealed that having DM increases the risk of having difficulty 10.188-fold [OR: 10.188; 95% CI: 1.156-89.769; *p*=.037]. Although it was not significant in univariate analysis [OR: 3.111; 95% CI: 0.652-14.845; *p*=.283]. Both univariate and multivariate regression analysis revealed that age category, comorbidities, previous abdominal surgery, Murphy's sign, Palpable GB, GB thickness, CBD diameter, and number of gallstones are not significant predictors for LC difficulty.

Table (1):Univariate and multivariate Logistic regression analysis for the different risk factors parameters affecting LC difficulty (n = 51)

		Univariate				#Multivariate	
		Intraoperative outcome					
		Easy® (n=31)	Difficult/ very difficult (n=20)	OR (LL – UL 95%C.I)	p	OR (LL – UL 95%C.I)	p
Sex	Male	3 (30.00%)	7 (70.00%)	5.026 1.117-22.613	.036	20.078 (1.708-236.063)	.040
	Female®	28 (68.29%)	13 (31.71%)	1		1	
Age (years)	<50®	22 (61.11%)	14 (38.89%)				
	≥50	9 (60.00%)	6 (40.00%)	1.048 0.306-3.589	1.000	0.139 0.012-1.608	.114
BMI (kg/m^2)	Normal (<25)®	14 (87.50%)	2 (12.50%)	1		1	
	Pre-obese (25.1 – 27.5)	9 (52.94%)	8 (47.06%)	6.222 (1.069-36.213)	.042	1.267 (0.136-11.805)	.834
	Obese (>27.5)	8 (44.44%)	10 (55.56%)	8.750 (1.522-50.309)	.015	9.617 (1.319-70.094)	.026
Comorbidities	No®	23 (63.39%)	13 (36.11%)				
	Yes	8 (53.33%)	7 (46.67%	1.548 0.456-5.25	.482	0.434 0.041-4.612	.489
DM	No®	28 (65.12%)	15 (34.88%)	1		1	
	Yes	3 (37.50%)	5 (62.50%)	3.111 0.652-14.845	.283	10.188 (1.156-89.769)	.037
Previous abdominal surgery	No®	9 (27.37%)	10 (52.63%)	1		1	
	Lower	19 (67.86%)	9 (32.14%)	0.4263 (0.128-1.415)	.164	0.575 (0.034-9.697)	.701
	Upper	3 (75.00%)	1 (25.00%)	0.300 (0.026-3.428)	.333	0.501 (0.005-51.853)	.770
Previous attack	No®	10 (90.91%)	1 (9.09%)	1		1	
	Yes	21 (52.50%)	19 (47.50%)	9.048 1.057-77.46*	.021	20.371 (1.505-275.663)	.023
Murphy's sign	No®	3 (61.22%)	19 (38.78%)	1		1	
	Yes	1 (50.00%)	1 (50.00%)	1.579 0.093-26.78	1.00	0.541 (0.006-47.531)	
Palpable gallbladder	No®	29 (64.44%)	16 (35.56%)	1		1	
	Yes	2 (33.33%)	4 (66.67%)	3.625 0.597-22.013	.307	0.861 (0.054-13.777)	0.916
Callots	No®	28 (80.00%)	7 (20.00%)	1		1	
	Yes	3 (18.75%)	13 (81.25%)	17.33 0.385-77.99	<.001	0.279 0.015-5.309	.396
Adhesion	No®	23 (100.0%)	0 (0.00%)	1		1	
	Yes	8 (28.57%)	20 (71.43%)	3.50 1.949-6.287	<.001	~0.000 0.00-0.00	0.996
GB wall thickness	Normal®	10 (76.93%)	3 (23.07%)	1		1	
	Increased wall thickness	21 (55.26%)	17 (38.64%)	2.698 0.639-11.389	.167	6.654 (0.700-63.288)	0.099
CBD diameter	Normal®	27 (61.36%)	17 (36.64%)	1		1	
	Increased	4 (57.14%)	3 (42.86%)	1.191 0.237-5.991	1.00	1.622 (0.064-41.207)	.770
Number of gallstones	Single®	3 (50.00%)	3 (50.00%)	1		1	
	Multiple	28 (62.22%)	17 (37.78%)	0.607 0.110-3.357	.896	0.399 (0.018-8.810)	.561

Table (2): Distribution of the studied cases according to sex,BMI with LC difficulty (n=51)

Sex	Total	LC Difficulty		Test of significant p-value
		Easy	Difficult/Very Difficult	
Male				
– n	10	3	7	$\chi^2_{(df=1)}$=4.945, p=.036* OR=5.026 95% CI: (1.117-22.613*)
– % within Sex	100.00%	30.00%	70.00%	
– % within LC difficulty	19.61%	9.68%	35.00%	
Female				
– n	41	28	13	
– % within Sex	100.00%	68.29%	31.71%	
– % within LC difficulty	80.39%	90.32%	65.00%	
BMI		**LC Difficulty**		**Test of significant p-value**
		Easy	**Difficult/Very Difficult**	
Normal <25 kg (n=16) (48.48%)				$\chi^2_{(df=1)}$=4.661, p=.031* OR: 6.222 95% CI: 1.069-36.213*
– n				
– % within BMI		14	2	
– % within LC difficulty		87.50%	12.50%	
		63.87%	20.00%	
Pre-Obese (25.1-27.5 kg) (n=17) (51.52%)				
– n				
– % within BMI		9	8	
– % within LC difficulty		52.94%	47.06%	
		39.13%	80.00%	
Obese (>27.5 kg) (n=18) (51.52%)				$\chi^2_{(df=1)}$=6.876, $p_{(MC)}$=.008* OR: 8.750 95% CI: 1.522-50.309*
– n		8	10	
– % within BMI		44.44%	55.56%	
– % within LC difficulty		36.36%	83.33%	

Conclusion

Predicting a difficult LC can enable a surgeon to discuss the likelihood of conversion with patient, helping to prepare them psychologically and plan for the most appropriate surgical approach. A high-predicted risk of conversion can also enable surgeon to decide early to switch to open procedure when difficulties arise intraoperatively, this can help reducing operative time and associated morbidity, ultimately improving patient safety and outcomes. Decision to convert to an open procedure should not be seen as a failure or a complication but rather as a preventive measure to avoid intraoperative or postoperative complications.