

Compendious scoring approach for prediction of difficult laparoscopic cholecystectomy: prospective study

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Abstract

Background: The use of quantifiable and reproducible measurement tool for pre-operative prediction of difficult laparoscopic cholecystectomy by compendious scoring method is a key for the successful pre-operative assessment and documentation of therapeutic response. Although in clinical trials have not been demonstrated for application in patients suffering from gallstone disease. As justification we carried out a study to vindicate a pre-operative prediction of difficult laparoscopic cholecystectomy scoring tool.

Methods: This prospective study conducted in tertiary care single center General surgery department Ziauddin University Hospital from April 2016 to August 2016. Our trial comprise of one hundred and thirty six patients. Patient's evaluation and operated by skilled surgeons.

Results: As an outcome that statistically significant features are history of previous episodes of cholecystitis/pancreatitis, gallbladder status and gallbladder wall thickness for prediction of difficult cases. According to this pre-operative compendious scoring method we had $p < 0.001$ for prediction of difficult laparoscopic cholecystectomy. Conversion figure was 0.7%.

Conclusion: We put forward that with the use of this compendious scoring approach for pre-operative prediction may encourage to label as probably difficult and very difficult cases. A patient's situation expose to danger and possibility of conversion may be counseled. Thus the surgeon may have a possibility to bring about planning appropriately and enlightened for further complications.

Keywords: Difficult cholecystectomy, validation study, prospective observational study, risk factors, prediction, scoring system

Introduction:

Laparoscopic cholecystectomy has received nearly global acceptance and is currently considered the criterion standard for the treatment of symptomatic gallstone disease and put back open cholecystectomy.¹⁻⁴ It recommended to patients for the benefit of insignificant post-operative pain, less adhesions intra abdominally, not as much hospital stay, more desirable cosmetic out-turn, offer great visualization with adequate way in for surgery.⁵⁻⁸ Evaluation of pre-operative risk factors is necessitated to keep away difficulties and impede for a well-run path for laparoscopic cholecystectomy.⁹ Multiple variables lead to strenuous laparoscopic cholecystectomy¹⁰ anticipate and make it easier with compendious scoring approach, danger patients can enlight-

ened prior to operate in respect of the difficulties and turn to open, planning in a way that is appropriate. Study end target is to outline and validate a scoring approach for pre-operative prediction of difficulty in laparoscopic cholecystectomy.

Methods:

Prospective observational descriptive trial organized in tertiary care single center General Surgery department Ziauddin University Hospital Karachi Pakistan from April 2016 to August 2016. Validation trial started after taking written consent and ethical committee approval. Our trial comprised on one hundred and thirty six consecutive patients undergoing for laparoscopic cholecystectomy. Patient's evaluation and op-

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Table 1: Study variables between easy and difficult laparoscopic cholecystectomy

Study Variable	Group		Mean Difference	P-Value
	Easy Lap chole (n=124)	Difficult Lap chole (n=12)		
Age in Years	36.03 ± 9.91	48.91 ± 5.85	12.88	<0.001*
Score	2.88 ± 1.11	6.25 ± 0.45	3.36	<0.001*
Operative time	44.79 ± 4.87	61.25 ± 8.01	16.45	<0.001*

Table 2: Study variables between male and female

Study Variable	Gender		Mean Difference	P-Value
	Male (n=44)	Female (n=92)		
Age in Years	40.43 ± 7.36	35.60 ± 11.12	4.82	0.003*
Score	3.52 ± 1.67	3.02 ± 1.28	0.50	0.087
Operative time	47.61 ± 7.27	45.59 ± 6.78	2.01	2.01

Table 3: Study variables compare with easy and difficult laparoscopic cholecystectomy

Study Variable	Attributes	Groups		P-Value
		Easy	Difficult	
Gender	Female	86(63.2%)	6(4.4%)	0.171
	Male	38(27.9%)	6(4.4%)	
Preoperative Assessment/ Diagnosis	Acute cholecystitis	44(32.4%)	2(1.5%)	
	H/o acute cholecystitis	53(39%)	6(4.4%)	
	Cholangitis	4(2.9%)	1(0.7%)	
	Chronic cholecystitis	16(11.8%)	2(1.5%)	
	Incidental finding	7(5.1%)	1(0.7%)	
Co-Morbidities	DM	4(2.9%)	1(0.7%)	
	DM/HTN	0(0%)	1(0.7%)	
	HTN	8(5.9%)	4(2.9%)	
	NKCM	112(82.4%)	6(4.4%)	
Score Range	0-5	124(91.2%)	0(0%)	
	6 to 10	0(0%)	12(8.8%)	
CBC (Total leucocytes count)	Deranged	5(3.7%)	5(3.7%)	
	Normal	119(87.5%)	7(5.1%)	
LFTs (Alkaline Phosphatase)	Deranged	9(6.6%)	3(2.2%)	
	Normal	115(84.6%)	9(6.6%)	
U/S Gallbladder	Contracted	12(8.8%)	4(2.9%)	
	Distended	21(15.4%)	7(5.1%)	
	Normal	91(66.9%)	1(0.7%)	
GB wall	<4mm	64(47.1%)	6(4.4%)	
	>4mm	60(44.1%)	6(4.4%)	
Palpable GB/lump	No	121(89%)	9(6.6%)	
	Yes	3(2.2%)	3(2.2%)	
Peri-cystic fluid collection	No	115(84.6%)	8(5.9%)	
	Yes	9(6.6%)	4(2.9%)	
Common Bile Duct diameter	0.7	3(2.2%)	2(1.5%)	
	0.4-0.6	121(89%)	10(7.4%)	
Types of difficulties (Intra-operative)	Adhesions	7(5.1%)	7(5.1%)	
	Bleeding	2(1.5%)	0(0%)	
	Contracted GB	1(0.7%)	1(0.7%)	
	Difficult dissection	3(2.2%)	2(1.5%)	
	Distended GB	2(1.5%)	0(0%)	
	None	103(75.7%)	0(0%)	
	Perforation /leak	5(3.7%)	1(0.7%)	
	Conversion	0(0%)	1(0.7%)	

erated by four skilled surgeons with more than 20 years credential in Laparoscopic and General surgery. The parameters scrutinized in the pre-operative prediction compendious scoring tool were dotage, male, history of hospitalization for cholecystitis/pancreatitis, obesity, previous upper abdominal surgery, Ultrasound findings gallbladder status and wall thickness, common bile duct diameter hematological CBC (Total leucocytes count), biochemical liver function test (alkaline phosphates) parameters. The laparoscopic cholecystectomy carried out with standard four port manner (two 10 mm, two 5 mm). All objective and subjective values were enrol to evaluate the difficulty of surgery. Total operation time calculated from surgical incision to wound suture. Pre-operative prediction score noted from 0-5 (easy) 6-10 (difficult) 11-16 (very difficult). Intra-operative difficulties put down on post-operative notes by the operating surgeon and assistant surgeons (blinded to the total pre-operative predictive score of difficulty). Data collected, write down by researcher earlier to surgery to keep away from possible prejudice. Thorough analyzed by statistically to find out a remarkable relation into the predictive score and intra-operative difficulty. SPSS version 21, STATA-14 was used.

Results:

Our second study composed of one hundred and thirty six patients. Consecutive patients for laparoscopic cholecystectomy during our survey period, females 92(67.6%), male were 44(32.4%) (figure 1) with mean age male 40.43 ± 7.36, and female 35.60 ± 11.12 mean difference 4.82 p-value 0.003* years were studied (Table 2). Mean operating time was 46.2 ± 6.98 (40–80) min. Conversion was 0.7 %. The mean pre-operative evaluation score was 3.18 ± 1.43 (1–7), and the risk score 0-5 was 124(91.2%), 6-10 was 12(8.8%) (Table 3). Never turn to open procedure because of artery bleed or bile spillage. One case turned to open procedure because of hard adhesions at calot's and surrounding structure due to gangrenous perforated gallbladder. Objective and subjective values for difficulty tie in with each other besides the suggested pre-

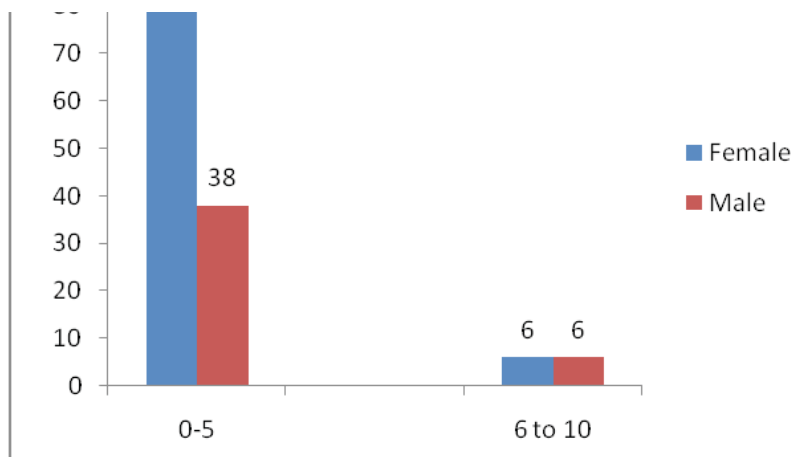


Fig.1: Gender distribution of the patients with respect to score

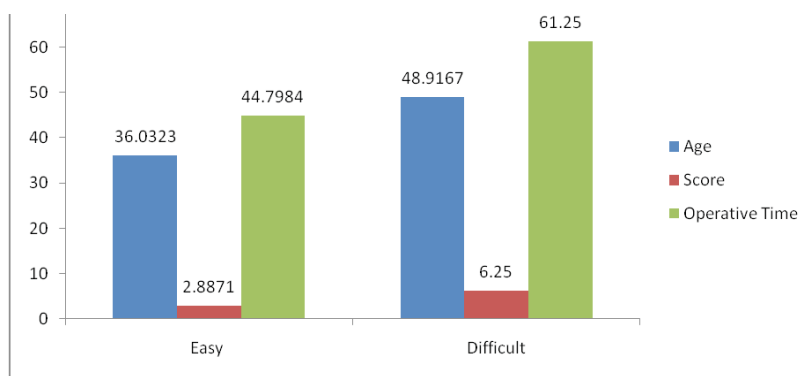


Fig.2: Age, score and operative time distribution between easy and difficult laparoscopic cholecystectomy

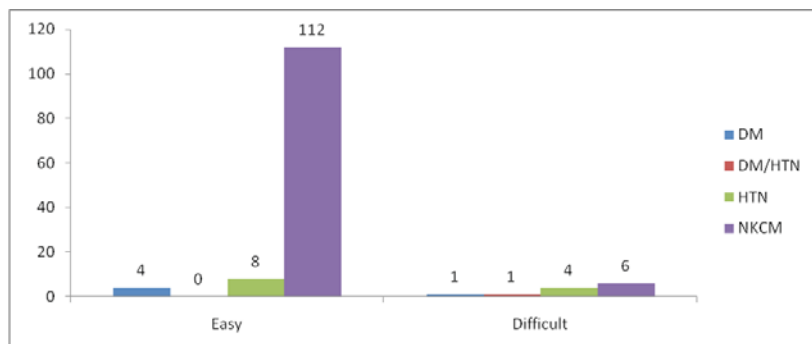
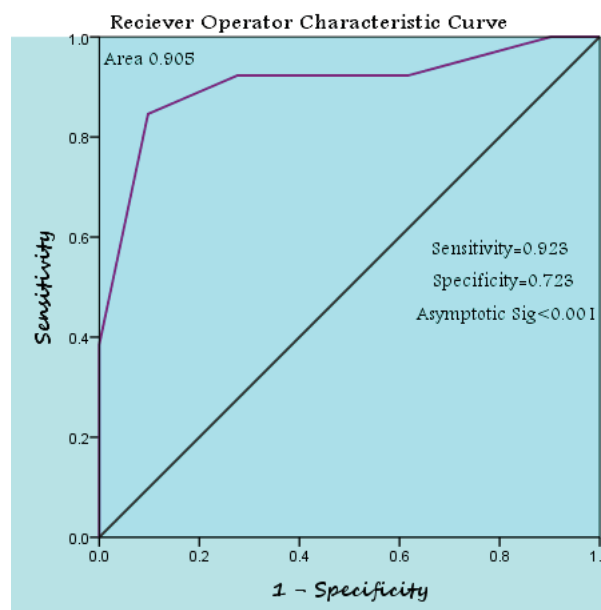


Fig.3: Comorbidities distribution between easy and difficult laparoscopic cholecystectomy

dictive difficulty score. Statistically significant pre-operative predictive variables are previous episodes of cholecystitis/pancreatitis, deranged biochemical test especially white blood count, hematological test alkaline phosphatase, palpable gallbladder, thick walled gallbladder and increase common bile duct diameter for prediction of difficult procedure. Moreover survey of variance disclosed a strong association between



Diagonal segments are produced by ties.

Fig.4: Area under ROC curve = 0.905 ROC= Receiving operating characteristics

ROC curve and its area under curve for predicting the operative outcome based on pre-operative scores

difficulty predictive score with intra-operative time, intra-operative difficulties and rate of turning to open procedure (Table 1 & 2). Consequently the predictive score for difficulty was justified with significant p value < 0.001* (Table 1). A ROC (Receiver Operating Characteristic) curve made to check accuracy of laparoscopic cholecystectomy score. It was AUROC of 0.905 (95% CI: 0.79 – 1.00), respectively. The sensitivity 0.923 (95%CI: 0.83 – 0.98) and specificity 0.723 (0.623- 0.81) of this score (figure 4). Demonstrated our data for validation, performed multiple tests (chi-square, fisher exact, independents sample t-test) for score, correction test.

Discussion:

At the present time a very great extent of practical contact and observation of laparoscopic cholecystectomy beside the considerable advancement has been made excellence of treatment surprisingly in difficult circumstances.^{11,12} On the condition that surgery go over 90 minutes, factors can expand the intra-operative time, past upper abdominal surgery, giant stones, difficult anatomy, distended dense walled gallbladder and/or turned to open surgery considered

as difficult procedure.¹ In our study the mean intra-operative time is in accordance with other studies. These studies showed intra-operative time 60 to 110 minutes accompanied by upper limit of 250 to 280 minutes.^{1,13-15} Great turning rate with intra-operative hurdles all are related to difficult laparoscopic cholecystectomy.¹⁶ Difficult access in peritoneal cavity, difficult adhesiolysis, difficult anatomy and gallbladder extraction related to difficult procedures.¹⁷ Some factors have been recognized as probable risk for conversion such as past episodes of acute cholecystitis, dense wall gallbladder, difficult anatomy and past upper abdominal surgery.¹⁸ In our study adhesions responsible for difficulty is 5.1%. Similar studies give an account of that past upper abdominal surgery related to a excessive adhesions, great risk of intra-operative hurdles, considerable turning figure, lengthen intra-operative time lead to increase hospital stay.^{14,19,20} Studies showed intra-operative bleeding as far as 10% with 2% average.^{21,22} In our study intra-operative bleeding was 1.5% in easy cases managed promptly by skilled hands but in these studies significant bleeding associated acute cholecystitis, thick walled gallbladder and adhesions. These studies showed considerable factors for turning in difficult cases were male gender, obesity, and cholecystitis,²¹⁻²⁴ difficult anatomy thick adhesion, significant bleeding.²⁵ Some other trials showed few factors that male, past upper abdominal surgery, thick walled gallbladder, > 60 years of age, acute cholecystitis significantly related to conversion to open procedure.^{26,27} The pre-operative predictive difficulty score given to all patients on the base of complete history, examination and on ultrasound findings.²⁶ In our study the aggregate score was 6 to 10 in difficult cases associated to turn open surgery. Similar findings in this study.²⁶ Some other studies showed same.^{16,28}

Conclusion:

We conclude that compendious scoring approach is very helpful for pre-operative prediction of difficult laparoscopic cholecystectomy. Compendious scoring approach delineate in the way that easy and well grounded representation

derived from basic variables. For that reason re-operative predictive scoring method appeared as efficacious tool to succeed in dealing with difficulty.

Conflict of interest: None

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Role and contribution of authors:

Dr Irum Masood, Ziauddin University and hospital Karachi, Design the study, data collection, tabulate and write-up introduction, discussion, result, conclusion

Dr Haris Rasheed, Consultant and laparoscopic General surgeon Ziauddin University and hospital Karachi, Supervise, Design the study, wrote initial methodology and review the article

Ahmed Raheem Statistician Department of Pathology & Laboratory Medicine Agha Khan University and Hospital Karachi, did statistical analysis

Dr Haider Naqvi Head of the department of Psychiatry & Epidemiologist, Ziauddin University and Hospital Karachi Pakistan, did statistical analysis and review the article

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