Prediction Score for Difficult Laparoscopic Cholecystectomy – Feasible?

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Abstract

Background: Laparoscopic cholecystectomy has received nearly universal acceptance and is currently considered the criterion standard for the treatment of symptomatic cholelithiasis. It is also the platform of training for surgeons. Problems like difficulty in allotment of the cases for training surgeons and junior residents, risks of possible difficulties intra op that can be encountered that needs to be explained to patient and attenders beforehand and failure of daycare surgery, can be lessened by prediction scores by helping to plan in advance. The aim of this study is to validate the Randhawa and Pujahari prediction scoring system for difficult laparoscopic cholecystectomy. The Primary objective is to estimate the sensitivity and specificity of this prediction score for Difficult laparoscopic cholecystectomy. **Material and Methods:** This is a retrospective cross-sectional study, conducted from 1st jan 2012 till 1st june 2018 in our institution. All patients undergoing laparoscopic cholecystectomy from 15 to 90 years of age, done by a single surgeon were included. Emergency surgeries, and those with gallbladder malignancies were excluded. 112 patients were selected based on universal sampling. The Randhawa and Pujahari prediction score of 5 and less denoted easy laparoscopic cholecystectomy. A score of 6 till 10 was difficult, and a score of 11 till 15 was very difficult respectively. **Results:** The original randhawa and pujahari study predicted sensitivity and specificity of 75.00% and 90.24%, respectively. The sample size in that study however was only 30. As per this study, the positive predictive value and specificity is highest in very difficult scores and the least in easy scores. The sensitivity and negative predictive value is highest in easy and least in very difficult. The overall accuracy is only 26.8%. **Conclusion:** While the predictive scores are useful to estimate to an extent the difficulty of the operative procedure pre operatively in a lot of cases, in our studies as well as other similar studies with sufficient sample size the test characteristics do vary in sensitivity and specificity in each study. Hence these predictive scores can be used to help anticipate difficulties but never determine the outcome with adequate certainty.

Keywords: Predictive score, Laparoscopic, Cholecystectomy, Gall Bladder Surgery.

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Introduction

Whereas it is true that no operation has been more profoundly affected by the advent of laparoscopy than cholecystectomy has, it is equally true that no procedure has been more

instrumental in ushering in the laparoscopic age than laparoscopic cholecystectomy has. Laparoscopic cholecystectomy has rapidly become the procedure of choice for routine gallbladder removal and is currently the most commonly performed major abdominal procedure in Western countries.[1] A National Institutes of Health consensus statement in 1992 stated that laparoscopic cholecystectomy provides a safe and effective treatment for most patients with symptomatic gallstones and has become the treatment of choice for many patients.[2] This procedure has more or less ended attempts at non invasive management of gallstones. Laparoscopic cholecystectomy decreases postoperative pain, decreases the need for postoperative analgesia, shortens the hospital stay from 1 week to less than 24 hours, and returns the patient to full activity within 1 week (compared with 1 month after open cholecystectomy).[3,4] Laparoscopic cholecystectomy also provides improved cosmetics and improved patient satisfaction as compared with open cholecystectomy. Although direct operating room and recovery room costs are higher for laparoscopic cholecystectomy, the shortened length of hospital stay leads to a net savings. More rapid return to normal activity may lead to indirect cost savings.[5] Not all such studies have demonstrated a cost savings, however. In fact, with the higher rate of cholecystectomy in the laparoscopic era, the costs in the United States of treating gallstone disease may actually have increased. Trials have shown that laparoscopic cholecystectomy patients in outpatient settings and those in inpatient settings recover equally well, indicating that a greater proportion of patients should be offered the outpatient modality.[6] Laparoscopic cholecystectomy has received nearly universal acceptance and is currently considered the criterion standard for the treatment of symptomatic cholelithiasis.[7,8] Many centres have special "short-stay" units or "23-hour admissions" for postoperative observation following this procedure. As laparoscopic cholecystectomy has become the gold standard of surgical management, also the platform of training for surgeons, there comes a difficulty in allotment of the cases for training surgeons and junior residents. Moreover patients are also unaware of the certainty of the risks of possible difficulties that can be encountered for them. Daycare surgery is a blooming filed where a simple laparoscopic cholecystectomy qualifies as a candidate. However informed consent regarding the failure of daycare surgery is as such another problem in planning. Prediction scores have the advantage of priming the surgeon and the patient to the possibility of complications that can ensure, thereby planning in advance is a well sought after benefit. This prediction score is a useful tool that can enable the surgeons to plan ahead, like advising the patients to defer daycare surgery, making sure the senior surgeon is present as a backup etc. The aim of this study is to validate the Randhawa and Pujahari prediction scoring system for difficult laparoscopic cholecystectomy. The Primary objective is to estimate the sensitivity and specificity of this prediction score for difficult laparoscopic cholecystectomy.

Methodology

This is a retrospective cross-sectional study, conducted in our institution. All patients undergoing laparoscopic cholecystectomy, age range from 15 to 90, done by a single surgeon were included. Emergency surgeries, and those with gallbladder malignancies were excluded. The study was conducted from 1stjan 2012 till 1stjune 2018. Around 112 patients were selected based on universal sampling. All of them satisfied the inclusion criteria. Records were retrospectively used for data collection. The prediction scoring system that was validated was the Randhawa and Pujahari prediction scoring system. [Table 1]

Table 1: Randhawa and Pujahari scoring system.

History			Max score
Age	< 50 (score 0)	> 50 (score 1)	1
H/o hospitalization	No (score 0)	Yes (score 4)	4

BMI	< 25 (score 0)	25 to 27.5 (score 1) > 27.5 (score 2)	2
Clinical			
Palpable gallbladder	No (score 0)	Yes (score 1)	1
Abdominal scar	No (score 0)	Infraumbilical (score 1) Supraumbilical (score 2)	2
Ultrasound findings			
Wall thickness	4mm and less (score 0)	>4mm (score 2)	2
Impacted stones	No (score 0)	Yes (score 1)	1
Pericholecystic collection	No (score 0)	Yes (score 1)	1
Total score			15

Surgery was done using CO2 pneumoperitoneum with 10 mm Hg pressure and using standard two 5 mm and two 10 mm ports. The timing was noted from the first port site incision until the last port closure. Time taken for surgery Bile/stone spillage, Injury to cystic duct or cystic artery Conversion to open cholecystectomy were noted. The prediction score was used to predict the level of difficulty of laparoscopic cholecystectomy. The difficulty is graded as easy, difficult, and very difficult, defined as per criteria given in table 2. A score of 5 and less denoted easy laparoscopic cholecystectomy. A score of 6 till 10 was difficult, and a score of 11 till 15 was very difficult respectively.

Table 2: Criteria for grading of difficulty.

Factors	Easy	Difficult	Very difficult
Time taken (minutes)	<60 min	60 to 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

The parameters collected from the case records were analysed preoperatively and a score was given. Then the intra-op factors were calculated and the level of difficulty was ascertained. Now the score predicted by the Randhawa and Pujahari scoring system, was compared with the intra-op level of difficulty and thus was validated. To avoid bias in surgical outcome, all patients enrolled in study were operated by a single laparoscopic surgeon without knowing the score of pre-operative prediction for difficult laparoscopy. All patient received same antibiotic regimen and post op care. The following study was approved by Institutional Ethical Committee participants.

Analysis was done by SPSS software. The results were as follows

RESULTS

The sample size of this study was 112. The age range of the participants was 17 till 82. The mean age was 50 years. There were 63 females and 49 males included. The male female ratio was 1:1.3. 5 out of 112 people had a BMI of more than 27.5. And 2 had 25 till 27.5. 45 patients had a history of previous hospitalisation and 8 were only for ERCP. 20 patients had abdominal scar, and 8 among them were infra-umbilical. 21 patients had a clinically palpable gallbladder. However, only 12 cases of impacted stones were identified in ultrasound. 45 patients had gallbladder wall thickening of more than 4mm. 13 cases had peri-cholecystic fluid collection. 35 cases had bile spillage, and 21 cases were converted to open. There were

no bile duct injuries in the time period of study. Intra-op, 3 cases were easy, 57 cases were difficult and 51 cases were very difficult. The prediction score however was not very accurate in predicting the difficulty of cases. Only 3 easy, 24 difficult and 3 very difficult cases amounting to 30 cases were correctly predicted. [Table 3]

Table 3: Test characteristics Results.

	Sensitivity	Specificity	Positive predictive value	Negative predictive value
Easy	100%	36.7%	4.2%	100%
Difficult	42.1%	78.2%	66.7%	56.6%
Very difficult	5.9%	100%	100%	56%
Overall	26.8%	100%	100%	0%

Table 4: Test Characteristics Data

Easy score			
	Disease positive	Disease negative	
Test positive	3	69	72
Test negative	0	40	40
	3	109	112
Difficult score			
	Disease positive	Disease negative	
Test positive	24	12	36
Test negative	33	43	76
	57	55	112
Very difficult score			
	Disease positive	Disease negative	
Test positive	3	0	3
Test negative	48	61	109
	51	61	112
Overall score			
	Disease positive	Disease negative	
Test positive	30	0	30
Test negative	82	0	82
	112	0	112

Overall the easy cases had a sensitivity of 100%, specificity of 36.7%, positive predictive value of 4.2%, negative predictive value of 100%. The difficult cases had a sensitivity of 42.1%, specificity of 78.2%, positive predictive value of 66.7%, negative predictive value of 56.6%. The very difficult cases had a sensitivity of 5.9%, specificity of 100%, positive predictive value of 100%, negative predictive value of 56%. Overall, only 30 cases (26.8%) were true positives.

As per this study, the positive predictive value and specificity is highest in very difficult scores and the least in easy scores. The sensitivity and negative predictive value is highest in easy and least in very difficult. The overall accuracy is only 26.8%.

DISCUSSION

The scoring system was devised by Jaskiran S. Randhawa and Aswini K. Pujahari In the year 2007, the history of previous hospitalisation was significant, as per this study, the history of hospitalisation was associated with every correct prediction. The sensitivity of the scoring system overall was low (26.8%), unlike other studies. The comparison of scores of different levels of obstruction was different. The original Randhawa and Pujahari study predicted

sensitivity and specificity of 75.00% and 90.24%, respectively. The sample size in that study however was only 30.[8] A similar study,[9] also had sensitivity of 76.47% and specificity of 100%. The sample size however was only 30. The individual difficulties were variable in this study. The positive predictive value in predicting an easy and difficult cholecystectomy were 4.2% and 66.7%. Other studies however revealed a positive predictive value of 81.9% for easy and 75% for difficult.[10] And in another study, difficult had a sensitivity of 85% and specificity of 97.8%. As per one study, the Prediction comes true in 90% for easy and 88% for difficult, the sample size was 210. In our study we observed a sensitivity of 100% and 42.1%. A similar study had a sensitivity of 85% and specificity of 97.8%.for difficult scores. Sample size was 323. In our study, the sensitivity and specificity were 42.1% and 78.2% respectively. Hereby the results are varied compared to previous study result. The confounding factors are yet to be sorted out.[11,12]

CONCLUSION
While predictive scores are useful to estimate to an extent the difficulty of the operative procedure pre operatively in a lot of cases, in our studies as well as other similar studies with sufficient sample size the test characteristics do vary in sensitivity and specificity in each study. Hence these predictive scores can be used to help anticipate difficulties but never determine the outcome with adequate certainty.

Limitations: Small sample size, is a limitation to this study.

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