Original Research Article

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Role of scoring system in prediction of difficult laparoscopic cholecystectomy

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ABSTRACT

Background: One of the most common reasons for admission to hospital is cholecystectomy and it has a mortality rate of 0.45% to 6%. Many risk factors have been found to be associated laparoscopic cholecystectomy that make it difficult like advance age, male gender, fever, obesity, previous abdominal surgeries, thick gall bladder lining, distention of bladder, presence of gall stones. There have been different scoring systems in literature that determine the risk of conversion to open cholecystectomy. The aim of present study is to determine the role of scoring system in predicting difficult laparoscopic surgery.

Methods: The present prospective study was conducted for a period of 1 year in the Department of Surgery at Guru Gobind Singh Medical College, Faridkot, Punjab. The study included all the patients with symptomatic gall stones reporting to the OPD of the hospital. Patients were categorized into two groups after the surgery. Group I included patients who underwent successfully laparoscopic cholecystectomy and group II included those who were converted into an open case. In this study all the entities were provided with a score. Patients with score less than 4 were grouped as difficult. At the end of the study all the data were analyzed to see how scoring system can predict which patients will have easy or difficult laparoscopic cholecystectomy based on postoperative scoring. All the data was recorded in a tabulated form and analyzed using SPSS software.

Results: The present prospective analytical study involved 112 subjects; out of these 94 were males and 18 females. The mean age of subjects was 48.2±3.7 years. There were 98 patients in Group I and 8 patients in group II who had didn't show presence of peri cholecystic fluid. There was 1 patient in Group I and 5 patients in group II who had peri cholecystic fluid on ultrasound. There were 104 subjects with gall was thickness less than 4 mm. There were 95 patients in Group I and 9 patients in group II who had who had bladder wall thickness of less than 4 mm.

Conclusions: The scoring tool evaluated in our study is useful in evaluating the risk of conversion of laparoscopic cholecystectomy into open cholecystectomy.

Keywords: Cholecystectomy, Laparoscopic, Prospective

INTRODUCTION

One of the most common reasons for admission to hospital is cholecystectomy and it has a mortality rate of 0.45% to 6%. It depends on the severity of the disease. Cholecystectomies accounts for significant workflow in the department of gastrointestinal surgery and

emergency.^{2,3} Therefore there is a crucial and important need to optimize care and determine various care pathways which require complete understanding of the underlying disease.^{4,5} Symptomatic gall stones are generally managed by laparoscopic cholecystectomy.⁶ Since long, videoscopy has been associated with general surgery. For this reason, it is necessary that the residents

and the surgeons should be trained in the techniques of videoscopy. Many risk factors have been found to be associated laparoscopic cholecystectomy that make it difficult like advance age, male gender, fever, obesity, previous abdominal surgeries, thick gall bladder lining, distention of bladder, presence of gall stones.7 Various studies have determined different parameters as risk factors. In a study by Kama et al, there were six parameters that were considered as risk factors.8 Those were male gender, tenderness in upper abdomen, more than 60 years and preoperative diagnosis of acute cholecystitis have been found to be significantly associated with the risk of open cholecystectomy. Initially the scoring system developed for laparoscopic cholecystectomy was based on the previously recorded video procedures. There is need for development of scoring system to inform the high-risk groups prior to the so that they can make the required arrangements before surgery. It is useful for the surgeons also, in a way that time and schedule of the surgery can be managed appropriately. High risk subjects have to stay in hospital for longer duration and require more intensive care. There have been different scoring systems in literature that risk of conversion determine the to cholecystectomy. The aim of present study is to determine the role of scoring system in predicting difficult laparoscopic surgery.

METHODS

The present prospective study was conducted for a period of 1 year in the Department of Surgery at Guru Gobind Singh Medical College, Faridkot, Punjab. The study included all the patients with symptomatic gall stones reporting to the OPD of the hospital. Ethical committee Clearance was obtained from the Institutional ethical committee and a written consent was obtained from the subjects in their vernacular language. Patients of cholangiogenic shock, chronic obstructive pulmonary disease, gall bladder carcinoma, cirrhosis of liver were not included in the study. The surgery was performed by a trained surgeon and the duration of surgery was recorded from the time taken from the insertion of verses needle or incision made in case of Hasson technique, till the closure of skin. A 90minute time was taken as ample duration for the surgery. After 90 minutes laparoscopic surgery was converted to open cholecystectomy. The decision to convert was solely taken by operating surgeon reasons for conversion such as adhesions/ bleeding, common bile duct injury, etc were recorded at the end of surgery. Patients were categorised into two groups after the surgery. Group I included patients who underwent successfully laparoscopic cholecystectomy and group II included those who were converted into an open case. In this study all the entities were provided with a score. Patients with score less than 4 were grouped as difficult. At the end of the study all the data were analysed to see how scoring system can predict which patients will have easy or difficult laparoscopic cholecystectomy based on postoperative scoring. A score of 1 was given to male

gender, BMI greater than 30, age greater than 50 years, size of single gall stone more than 20, more than mm thickness of gall bladder on ultrasound and presence of pericholecystic fluid collection. Patients underwent complete haematological investigation like Random blood sugar, Liver and renal function test, complete haemogram etc before undergoing surgery. Alkaline phosphatase levels were also estimated of all the patients. All the data was recorded in a tabulated form and analysed using SPSS software. Chi square test was used as a test of significance P value of less than 0.05 was considered significant.

RESULTS

The present prospective analytical study involved 112 subjects; out of these 94 were males and 18 females. The mean age of subjects was 48.2±3.7 years.

Table 1: Score prediction table of gender distribution.

Gender	Prediction		Total	Chi	P
	Laparoscopic	Conversion	Total	square	value
Female	87	7	94	9.867	0.006
Male	12	6	18		

Table 1 shows the gender distribution of the patients as per the score system criteria. There was a total of 87 females and 12 males in the laparoscopic group and 7 females and 6 males in the open group. A total of 94 females and 18 males were enrolled in the study. On applying chi square test, the p value was 0.006 indicating significant differences between male and females in the study.

Table 2: Score system prediction table showing peri cholecystic fluid collection.

	Prediction		Total	Chi	P
collection	Laparoscopic	Conversion	Total	square	value
No	98	8	106		
Yes	1	5	6	31.789	0.00
total	99	13	112		

Table 2 shows the distribution of the subjects according to the pericystic fluid collection. There were a total 6 subjects who showed the presence of peri cholecystic fluid. There were 106 subjects who didn't show any peri cholecystic fluid collection. There were 98 patients in group I and 8 patients in group II who had didn't show presence of peri cholecystic fluid. There was 1 patient in group I and 5 patients in group II who had peri cholecystic fluid on ultrasound. Sensitivity of using scoring system to pre-operatively predicts conversion in patients with peri cholecystic fluid collection is 98.9% and specificity is 38.4%. Positive predictive value is 92.4% and negative predictive value is 83.3%. On applying Chi square test, P value was 0.000, indicating that was a significant difference in subjects with and without peri cholecystic fluid.

Table 3: Score system prediction table showing gall bladder wall thickness.

Wall	Prediction		Total Chi P		P
thickness	Laparoscopic	Conversion	Total	square	value
<4mm	95	9	104		
>4mm	4	4	8		
Total	99	13	112	12.378	0.006

Table 3 shows the distribution of the subjects according to thickness of gall bladder wall. There were a total 8 subjects with gall wall thickness more than 4mm. There were 104 subjects with gall was thickness less than 4 mm. There were 95 patients in group I and 9 patients in group II who had who had who had bladder wall thickness of less than 4 mm. There were 4 patients in group I and 4 patients in group II with bladder wall thickness of more than on ultrasound. Sensitivity of using scoring system to pre-operatively predicts conversion in patients with bladder wall thickness of more than 4 mm is 95.9% and specificity is 30.7%. Positive predictive value is 91.3% and negative predictive value is 50%. On applying Chi square test, P value was 0.006, indicating that was a significant association of bladder wall thickness and prediction to open case. There was a conversion rate of 50% in patients with bladder wall thickness more than 4mm and a conversion rate of 8.6% in subjects with bladder wall thickness less than 4mm.

Table 4: Score system prediction table showing gall stone size.

Wall	Prediction		Total Chi		P
thickness	Laparoscopic	Conversion	Total	square	value
<20mm	97	8	105		
>20mm	2	5	7	26.043	0.000
Total	99	13	112		

Table 4 shows the distribution of the subjects according to gall stone size. There were a total 7 subjects with gall stone size more than 20mm. There were 105 subjects with gall stone size less than 20 mm. There were 97 patients in group I and 8 patients in group II who had who had gall stone size of less than 20 mm. There were 2 patients in group I and 5 patients in group II who had gall stone size of more than 20 mm on ultrasound. Sensitivity of using scoring system to pre-operatively predicts conversion in patients with gall stone size of more than 20mm is 97.9% and specificity is 38.4%. Positive predictive value is 92.3% and negative predictive value is 71.4%. On applying Chi square test, P value was 0.000, indicating that was a significant association of size of gall stone and prediction to open case. There was a conversion rate of 71.4% in patients with gall stone size of more than 20 mm and a conversion rate of 7.6% in subjects with gall stone size of less than 20mm.

Table 5 shows the prediction using score system. There was a total of 112 cases enrolled in the study, out of there 13 were converted to open cholecystectomy and 99

underwent laparoscopic cholecystectomy. The sensitivity of prediction using score system is 97.9% and specificity is 84.6%. The positive predictive value in this study is 97.9% and negative predictive value is 84.6%. The percentage of false negative prediction in the score system was only 2%. On applying chi square test, the p value was 0.

Table 5: Prediction using score system.

Prediction	Actual outcome		Total	Chi	P
	Laparoscopic	Conversio	1 otai	square	value
Laparoscopi	97	2	99		
Conversion	2	11	13	76.406	0.00
Total	99	13	112		

DISCUSSION

One of the few common reasons for elective or emergency surgery is gall bladder disease. There have been various advancements in management of cholecystitis and its associated complications.9 In the mid-1990s, there has been a significant shift in managing cases of cholecystitis with the introduction of laparoscopic cholecystectomy. 10 In the recent years there has been significant importance given to index during admission for laparoscopic cholecystectomy.¹¹ There is a huge variation in the outcome and approaches associated with gall bladder disease management in spite of various advances.¹² Even though there are various preoperative scoring systems but there is no operative classification associated with laparoscopic surgery. 13,14 Various predictors have been assessed to evaluate the degree of difficulty encountered during surgery. In our study, there were a total 8 subjects with gall wall thickness more than 4mm. There were 104 subjects with gall was thickness less than 4mm. Sensitivity of using scoring system to preoperatively predicts conversion in patients with bladder wall thickness of more than 4mm is 95.9% and specificity is 30.7%. Positive predictive value is 91.3% and negative predictive value is 50%. In a study conducted by Schrenk P et al, thickness of gall bladder was a predictor of conversion in 4.3% cases and in a similar study conducted by Fried GM et al, gall bladder thickness was a risk factor for conversion in 5.6% cases. 15,16 In acute cholecystitis, gall bladder wall is generally thickened on ultrasonographic results and it was significantly associated with conversion in some previous studies. 17,18 According to a study by Majeski James, presence of thickened gall bladder wall is a warning for the operating surgeon for difficult laparoscopic procedure that can be converted to open cholecystectomy. 19

But this was contrary to a study by Carmody E et al, according to them ultrasound evaluation for estimating thickness of gall bladder is not much of value for laparoscopic cholecystectomy. ²⁰ In our study, there were 98 patients in group I and 8 patients in group II who had didn't show presence of peri cholecystic fluid. There was 1 patient in group I and 5 patients in group II who had

peri cholecystic fluid on ultrasound. Sensitivity of using scoring system to pre-operatively predicts conversion in patients with peri cholecystic fluid collection is 98.9% and specificity is 38.4%. Positive predictive value is 92.4% and negative predictive value is 83.3%. According to a study conducted by N Gupta et al, peri cholecystic fluid collection was not found a significant factor associated with conversion to open case in contrast to our study.²¹ Therefore scoring system is a useful tool to evaluate the chances of conversion of laparoscopic case to an open cholecystectomy.

CONCLUSION

The scoring tool evaluated in our study is useful in evaluating the risk of conversion of laparoscopic cholecystectomy into open cholecystectomy. This study showed that preoperative score of 4 or more is associated with higher rate of conversion to open cholecystectomy. The scoring system used in our study was feasible in evaluating this incidence.

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Institutional Ethics Committee

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