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**Original Research Article**

# Preoperative prediction of difficult laparoscopic cholecystectomy using a scoring system

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## ABSTRACT

**Background:** Laparoscopic cholecystectomy (LC) has become gold standard for the surgical treatment of gallbladder disease. 2% to 15% of patients require conversion to open surgery for various reasons. Pre-operative prediction of "difficult laparoscopic cholecystectomy" may not only improve patient safety but also be useful in reducing the overall cost of therapy. The aim of this study is to study the factors determining the preoperative predictability of difficult laparoscopic cholecystectomy.
**Method:** 30 cases of laparoscopic cholecystectomy operated by a single experienced surgeon. There are total 15 score from history, clinical and sonological findings. They were evaluated and scored on the basis of scoring system of Randhawa and Pujahari. Score up to 5 is defined as easy, 6-10 as difficult and 11-15 as very difficult.
**Result:** Previous history of hospitalization for cholecystitis and increased gall bladder wall thickness were found statistically significant in predicting difficult LC.
**Conclusion:** The scoring system had a positive prediction value for easy prediction of 81.9% and for difficult prediction of 75%.

**Keywords:** LC, Predictive factors, Scoring system

## INTRODUCTION

Gall stone disease is a common problem affecting human being. Over the past two decades, laparoscopic cholecystectomy (LC) has become gold standard for the surgical treatment of gallbladder disease.[1] The advantages of laparoscopic cholecystectomy are many but not devoid of complications. The complications encountered during LC are numerous and some are specific to this unique technique and some are common to laparoscopic surgery in general. Approximately 2% to 15% of patients require conversion to open surgery for various reasons.[2,3] In the present study, we tried to assess some preoperative factors that might predict the chances of conversion as per Randhawa and Pujahari scoring system and other probable factors and the intraoperative factors that resulted in the conversions.[4]

## METHODS

A prospective study was carried out in Department of Surgery, at Acharya Vinoba Bhave Rural Hospital attached to Jawaharlal Nehru Medical College, Sawangi. 30 patients who underwent laparoscopic cholecystectomy irrespective of the age between June 2015 to May 2016 were included in this study. All patients with carcinoma gall bladder, CBD stone, dilated CBD, obstructive jaundice, and patients not willing to give consent to be a part of the study were excluded from this study.

***Study design:***

All the case of laparoscopic cholecystectomy operated by a single laparoscopic surgeon was included in the study. After the workup of the patient, a preoperative score will

be given to each patient on the basis of history, clinical examination, and sonographic finding as described in the scoring system of Randhawa and Pujahari (Table 1). Score up to 5 is defined as easy, 6-10 as difficult and 11-15 as very difficult.

**Table 1: Randhawa and Pujahari scoring system.**

| History | | | Max score |
|---|---|---|---|
| Age | < 50 (0) | >50 (1) | 1 |
| Sex | Female (0) | Male (1) | 1 |
| H/o hospitalization | No (0) | Yes (4) | 1 |
| **Clinical** | | | |
| BMI | <25 | >25-27.5 (1)<br>>27.5 (2) | 2 |
| Palpable GB | No (0) | Yes (1) | 1 |
| Abdominal scar | No (0) | Infraumbilical (1)<br>Supraumbilical (2) | 2 |
| **Sonography** | | | |
| Wall thickness | Thin (0) | Thick >4 mm (2) | 2 |
| Impacted stones | No (0) | Yes (1) | 1 |
| Pericholecystic collection | No (0) | Yes (1) | 1 |

Surgery were done using $CO_2$ 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. All the intraoperative events were recorded. The following operative parameters (Table 2) were recorded for all the patients undergoing LC:

- Time taken for surgery
- Bile/stone spillage
- Injury to cystic duct or cystic artery
- Conversion to open cholecystectomy.

**Table 2: Easy/difficult criteria.**

| Factors | Easy | Difficult | Very difficult |
|---|---|---|---|
| Time taken (minutes) | <60 min. | 60-120 min. | >120 min. |
| Bile / stone spillage | No | Yes | Yes |
| injury to duct or artery | No | Duct only | Both |
| Conversion to open | No | No | Yes |

Postoperatively, we defined the surgical procedure as easy, difficult and very difficult.

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.

***Statistical methods***

The statistical software namely SPSS 15.0 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables, etc. Chi-square test/Fisher exact test has been used to find the significant association of findings of preoperative score with preoperative outcome.

## RESULTS

Of the 30 patients included in the study, 11 patients were male (36.7 %) and 19 were females (63.3 %). The majority of patients were in the age group of ≤50 years (18 patients) and 40 % (12 patients) were >50 years. BMI of patients were, <25 in 14 (46.47%) patients; 25.1-27.5 in 10 (33.33%) patients and >27.5 in 6 (20%) patients. History of previous surgery was noted in 15 patients. It included 12 (40%) with tubectomy and 3 (10%) patients with lower (uterine) segment cesarean section. All patients with history of operation had infra-umbilical scar, none had supraumbilical scar. Nine (30%) patients had a previous history of admission; 4 (13.33%) for acute cholecystitis, and 5 (16.67%) for biliary colic. No patient had any history of jaundice. Gall bladder was palpable in only 2 (6.67%) cases. Ultrasonographic finding like gall bladder wall thickness was normal in 24 (80%)patient and increased in 6 (20%) patients, impacted stone noted in 6 (20%) patients and pericholecystic collection in only 1 (3.33%)patient.

Five patients presented with hypertension and two with diabetes. Two (6.67%) patient underwent conversion to open cholecystectomy. On histopathology, no case of malignancy of the gallbladder was detected.

Twenty-two were scored easy (56.7%) and 8 (43.3%) were difficult and nil in very difficult group. The relation between the prediction of the difficulty level of the cases preoperatively and the actual outcome of the cases is shown in Table 3. We observed a positive predictive value of 81.9% for our scoring system for cases predicted to be easy. For cases predicted to be difficult we registered a positive predictive value of 75 % for the scoring system.

Postoperative outcome was correlated with the various factors included in the scoring system, and data analyzed to assess the significance of each factor (Table 4). From our data, we observed that previous history of hospitalizations and thickened wall of gallbladder were significant associated factors causing difficulties in laparoscopic cholecystectomy.

**Table 3: Correlation of pre-op score and outcome.**

| Pre-op score | Easy | Difficult | Very difficult | Total |
|---|---|---|---|---|
| 0-5 | 18 (81.9%) | 3 (13.7%) | 1 (4.4%) | 22 |
| 6-10 | 1 (12.5%) | 6 (75%) | 1 (12.5%) | 8 |
| 11-15 | - | - | - | - |
| Total | 19 | 9 | 2 | 30 |

**Table 4: Comparison of preoperative risk factors and surgical outcome in the present study with that conducted by Randhawa and Pujahari.**

| Risk factors | Level | Preoperative outcome | | p- value current study | P-value Randhawa and Pujahari |
|---|---|---|---|---|---|
| | | Difficult | Easy | | |
| | | No | No | | |
| Age | <50 years | 7 | 12 | 1.00, NS | 0.937 |
| | >50 years | 4 | 7 | | |
| Sex | Female | 9 | 10 | 0.139, NS | 0.736 |
| | Male | 2 | 9 | | |
| BMI | <25 | 7 | 7 | | |
| | 25.1-27.5 | 2 | 8 | 0.209, NS | 0.227 |
| | >27.5 | 2 | 4 | 0.6424, NS | 0.010 |
| Previous surgery | Nil | 3 | 12 | 0.1281, NS | 0.882 |
| | Yes | 8 | 7 | | |
| Hospitalisation | Nil | 5 | 16 | 0.0419, SS | 0.001 |
| | Yes | 6 | 3 | | |
| Gb palpable | NP | 9 | 19 | 0.1264, NS | 0.022 |
| | Yes | 2 | - | | |
| Us wall thickness | Normal | 5 | 19 | 0.0008, HS | 0.038 |
| | Thickened | 6 | - | | |
| Impacted stone | Nil | 8 | 16 | 0.6410, NS | 0.190 |
| | Yes | 3 | 3 | | |
| Pericholecystic collection | Nil | 10 | 19 | 1.00, NS | 0.999 |
| | Yes | | 1 | | |

## DISCUSSION

Age is a risk factor for difficult GB surgery.[5] In the present series, the majority of patients were in the age group of ≤50 years (25 patients) and only 16.7% (five cases) were >50 years. In the present study, we found no significant correlation between age and the difficult level of surgery. This could be because of the small sample size of the study population. Male sex has been described to be associated with difficult LC.[6] In the present study, there were 11 males and 19 females. Post-surgery 50.0% males (2 out of 11) turned out to have a difficult procedure. Small study group and an unequal distribution of patients on the basis of sex could have altered the results in the present series.

Obesity poses a great challenge to the safe and timely completion of the procedure due to various factors in

form abdominal access, dissection of fatty calot.[7] In the present study, 6 were obese patients and only 2 had difficult cholecystectomy but without conversion. We found no significant correlation between BMI and difficult level of surgery and this could be perhaps because of the surgical expertise. History of hospitalization due to episodes of cholecystitis has a correlation with the difficulty level of cholecystectomy as it may lead to increased gall bladder wall thickness and causing scarring and fibrosis of gall bladder.[8] In the present study, we found strongly significant correlation between previous history of hospitalization and difficult LC. In study by Randhawa and Pujahari, clinically palpable gall bladder was found to be a predictor of difficult laparoscopic cholecystectomy but in the present study, only 2 patients had clinically palpable GB and both had a difficult procedure during surgery.[4] But it turned out to be statistically insignificant. This could be due to less number of cases having a palpable gall bladder in the present study. There are less number of studies supporting clinically palpable GB as a predictor of difficult LC.

Increased GB wall thickness is also linked with difficult gall bladder dissection as well as manipulation of GB becomes difficult.[9] In the present study, we found extremely significant correlation between the GB wall thickness and the difficulty level of surgery. History of previous surgery especially upper abdominal may pose difficulty due to unwanted adhesion around the umbilicus and peri gall bladder area.[10] In the present study 15 patients had history of previous surgeries but were lower abdominal scars mainly of previous tubal ligation in female patients. We did not find any significant association between previous surgery and difficulty level. We also did not find any significant association between impacted stone and pericholecystic collection with the difficulty level of the procedure.

Two patients (1 male and 1 female) had conversion to open cholecystectomy. The cause of conversion in male patient was empyema with friable gall bladder wall and peri cholecystic collection and in female patient was fibrosed gall bladder with adhesion. To study any additional factor which might have an association with difficulty level, we found 5 patients to be diabetic out which 3 had difficult LC and 2 were hypertensive with 1 had difficult LC. But no significant statistical significance could be awarded to each in this study. Few studies had found diabetes as a predictor of difficult laparoscopic cholecystectomy.[5,11]

Kanaan SA, Murayama KM, in 2002 found that patients with a history of cardiovascular disease (hypertension) had an increased risk for conversion to open cholecystectomy in both the acute and chronic cholecystitis groups particularly in male sex.[12]

## CONCLUSION

Previous history of hospitalization for cholecystitis and increased gall bladder wall thickness were found statistically significant in predicting difficult LC. This scoring system is a good test for pre-operative predicting the difficulty of LC. To determine additional factors which might play a role in outcome was difficult to predict and need a large sample size.

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## REFERENCES

1. Soper NJ, Stockmann PT, Dunnegan DL, Ashley SW. Laparoscopic cholecystectomy: the new gold standard? Arch Surg. 1992;127:917-21.
2. Alponat A, Kum CK, Koh BC, Rajnakova A, Goh PM. Predictive factors for conversion of laparoscopic cholecystectomy. World J Surg. 1997;21:629-33.
3. Sanabria JR, Gallinger S, Croxford R, Strasberg SM. Risk factors in elective laparoscopic cholecystectomy for conversion to open cholecystectomy. J Am Coll Surg. 1994;179:696-704.
4. Randhawa JS, Pujahari AK. Preoperative prediction of difficult lap chole: a scoring method. Ind J Surg. 2009;71:198-201.
5. Simopoulos C, Botaitis S, Polychronidis A, Tripsianis G, Karayiannakis AJ. Risk factors for conversion of laparoscopic cholecystectomy to open cholecystectomy. Surg Endosc. 2005;19:905-9.
6. O'Leary DP, Myers E, Waldron D, Coffey JC. Beware the contracted gall bladder: ultrasonic predictors of conversion. Surg. 2013;11:187-90.
7. Rosen M, Brody F, Ponsky J. Predictive factors for conversion of laparoscopic cholecystectomy. Am J Surg. 2002;184:254-8.
8. Rattner DW, Ferguson C, Warshaw AL. Factors associated with successful laparoscopic cholecystectomy for acute cholecystitis. Ann Surg. 1993;217:233-6.
9. Fried GM, Barkun JS, Sigman HH, Joseph L, Clas D, Garzon J, et al. Factors determining conversion to laparotomy in patients undergoing laparoscopic cholecystectomy. Am J Surg. 1994;167:35-9.
10. Botaitis S, Pitiakoudis M, Perente S, Tripsianis G, Polychronidis A, Simopoulos C. Laparoscopic cholecystectomy in acute cholecystitis: An analysis of the risk factors. S Afr J Surg. 2012;50:62-4.
11. Bedirli A, Sozuer E, Yuksel O, Yilmaz Z. Laparoscopic cholecystectomy for symptomatic gallstones in diabetic patients. J Laparoendosc Adv Surg Tech. 2001;11:281-4.
12. Kanaan SA, Murayama KM, Merriam LT, Dawes LG, Prystowsky JB, Rege RV, et al. Risk factors for conversion of laparoscopic to open cholecystectomy. J Surg Res. 2002;106:20-4.

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