PRE-OPERATIVE EVALUATION OF RISK FACTORS FOR DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY

Chandrika Sah,[1] Nabin Pokharel,[1] Prakash Paudel,[1] Sunil Shrestha,[1] Shahid Alam,[2] Aditya Prakash Yadav[2] and Rahul Singh[3]

[1]Department of Surgery, Nepal Medical College, Attarkhel, Gokarneshwor-8, Kathmandu, [2]Department of Surgery, National Medical College, Birgunj, Parsa [3]Department of Surgery, Nepalgunj Medical College, Kohalpur, Nepal

ABSTRACT

Cholelithiasis or the gallstone disease is the most common biliary pathology. 10-15% population of western world is estimated to be affected by gallstone disease, of which majority remains asymptomatic (>80%) and 1-2 % of these asymptomatic patients will develop symptoms needing surgery per year. In this prospective study, 77 patients years undergoing elective Laparoscopic Cholecystectomy (LC) and meeting all inclusion criteria in Department of General Surgery, Nepal Medical College and Teaching Hospital over period of 1 year. History, detailed clinical examination and laboratory investigations were performed as per the working proforma. Operative time and conversion to open cholecystectomy were recorded. The association between clinical, laboratory and sonographic factors with difficult laparoscopy were obtained. Data analysis was done using SPSS-17 version. Out of 77 patients, 63 were females. Body mass index (BMI) above 30 representing obese population were 33.2% with p value 0.0004. Also, 41.5% patients had history of acute cholecystitis while 12.9% patients had previous history of abdominal surgery and 70.1% patients had history of recurrent abdominal pain. Total of 19.4% patients had increased leucocyte count. On ultrasonography thickened GB wall of >3 mm was seen in 42.8%, distended GB was seen in 41.5%, stone size of >1 cm was seen in 70.1% patients and multiple stones were seen in 84.4%. Similarly, duration of surgery was >90 mins in 31.1% and 7.04% patients underwent conversion to open cholecystectomy both of which were considered difficult laparoscopy. Our study reveled that clinical factors like age, BMI, history of acute cholecystitis, previous history of recurrent abdominal pain and past history of abdominal surgery had significant association in prediction of difficult LC.

KEYWORDS

Difficult laparoscopic cholecystectomy, pre-operative predictors, risk factors.

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CORRESPONDING AUTHOR

Dr. Chandrika Sah,
Lecturer,
Department of Surgery,
Nepal Medical College Teaching Hospital,
Attarkhel, Gokarneshwor-8, Kathmandu, Nepal
Email: chandrikasah62@gmail.com
Orcid No: https://orcid.org/0009-0007-4282-295X
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INTRODUCTION

Laparoscopic cholecystectomy (LC) has become the treatment of choice for gallstones. This has been established as the primary procedure for vast majority of patients with benign gallbladder (GB) disease.[1] Conversion to open cholecystectomy is occasionally needed to avoid or repair injury, delineate confusing anatomic relationships, or treatment of associated conditions. However, this has been associated with increased overall morbidity, surgical site and pulmonary infections and longer hospital stays.[2,3]

The ability to accurately identify an individual patient's risk for conversion based on preoperative information can result in more meaningful and accurate preoperative counseling, improved operating room scheduling and efficiency and stratification of risk for technical difficulty. It helps to identify patients in whom a planned open cholecystectomy is indicated, also improving the patient safety by minimizing time to conversion.[5,6]

Aim of this study was to valuated various clinical, laboratory and ultra-sonographic factors to preoperatively predict the factors for difficult laparoscopic cholecystectomy.

MATERIALS AND METHODS

This study was carried out in department of surgery, Nepal Medical College Teaching Hospital over a period of one year from January 2023 to February 2024. Ethical approval was taken from Institutional Review Committee of Nepal Medical College. A total of 77 patients undergoing elective LC and meeting all inclusion criteria were included in this study.

The sample size was calculated based on the following formula.

$N = Z2 \times p \times q / d2$

Where,

n = Sample size,

Z = 1.96 ≈ 2 (considering confidence as 95%),

p = prevalence (prevalence is taken as 50% as exact prevalence is not known),

q = 100 – p that is 50%,

d = Absolute error which was 10%

After taking the informed consent data was collected using the proforma. History, detailed clinical examination and laboratory investigations was performed as per the working proforma which included patient age, sex, BMI, previous history of acute cholecystitis, history of recurrent abdominal pain, previous abdominal surgeries, CBC, sonographic findings including GB wall thickness, size and number of calculi. Operative time and conversion to open cholecystectomy was recorded. Procedure requiring <90 minutes was labeled easy while those with >90 minutes and need for conversion was labeled as difficult.

Descriptive statistics such as mean, SD and percentage was used to present the data. Chi-square test was used. A p-value less than 0.05 was considered as significant. Data analysis was performed using software SPSS-17.

RESULTS

A total of 77 patients were included in this study; the majority of them were females [n=63 (81.8%)]. In our study, the mean age was 38.2±13.5 years (range: 18–75 years). 63(81.8%) were female and 14 (18.8%) were male patients, with female to male ratio of 4.5:1. BMI above 30 who are obese were 32.4% (n=25). Regarding ultrasonography findings, 42 patients had multiple stones, whereas 8 patients had single stone. Thirty-two patients had wall thickness greater than 3 mm. Moreover, mean size of stone was 8.9±6.3 mm.

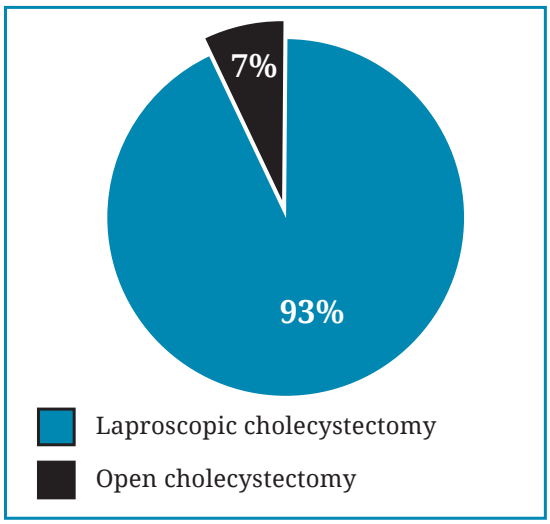

Fig. 1: Scoring factor to predict difficult lap cholecystecomy

The association of preoperative risk factors with the intraoperative outcome i.e. age (0.043), history of hospitalization for acute cholecystitis (0.001), BMI (0.0004), history of previous abdominal surgery (0.033), were considered as the significant factors that predict difficult laparoscopic cholecystectomy. Five patients (7.04%) underwent conversion of laparoscopic cholecystectomy to open cholecystectomy.

Table 1: Risk factor assessment with prevalence

	Assessment of Risk Factor		P value
	Easy	Difficult	
Age			
<50yrs	43 (86%)	18 (66.7%)	**0.046**
>50yrs	7(14%)	9(33.3%)	
Gender			
Male	8(16%)	6 (22.2%)	0.49
Female	42(84%)	21 (77.8%)	
BMI (kg/m^2)			
<30	44 (88%)	8 (29.7%)	**0.0004**
>30	6 (12%)	19 (70.3%)	
History of Acute Cholecystitis			
Present	14 (28%)	18 (66.7)	**0.001**
Absent	36 (72%)	9 (33.3)	
History of previous abdominal surgery			
Present	3 (6%)	7 (25.9%)	**0.013**
Absent	47 (94%)	20 (74.1%)	
History of Recurrent Abdominal Pain			
Present	31 (62%)	23 (85.2%)	**0.033**
Absent	19 (38%)	4 (14.8%)	
Total Leucocyte count			
<10,000	41 (82%)	21 (77.8%)	0.65
>10,000	9 (18%)	6(22.2%)	
GB Wall thickness (mm)			
<3	27 (54%)	17 (62.9%)	0.44
>3	23 (46%)	10 (37.1%)	
Stone Size (cm)			
<1	14 (28%)	9 (33.4%)	0.62
>1	36 (72%)	18 (66.6%)	
Distended Gall Bladder			
Present	22 (44%)	10 (37.1%)	0.554
Absent	28 (56%)	17 (62.9%)	
Number Of Stone			
Single	8 (16%)	4 (14.9%)	0.891
Multiple	42 (84%)	23 (85.1%)	
Duration of surgery			
<90min	37 (74%)	16 (59.2%)	0.182
>90 min	13 (26%)	11 (40.8%)	

DISCUSSION

Numerous similar studies had been conducted at international level had demonstrated the risk of conversion to Open Cholecystectomy is related to various factors like the surgeon's factor, equipment failure and more importantly patient's factors. Large number of clinical studies have reported patient's risk factors like age, sex, BMI and previous abdominal surgery.[8]

Mean age of the respondent was 38.2±13.5 years, whereas. Minimum age was 18 years and maximum was 75 years. In above study age is found to be significantly associated with difficult (p = 0.046). Similar study conducted by Kulkarni *et al*[7] among 166 patients found that there is significant association (p>0.05) between increasing age and difficulties in LC In an another study conducted by Kumar *et al*[8] among 112 cases also demonstrated age >50 years as predictor of the difficult LC. with P value <0.0001.

In this study there was total 63 case, were female. The incidence of gall bladder disease was more common among the females. This study revealed gender was not a predictor of difficult cholecystectomy with p-value of 0.84 which is insignificant. In a similar study by Randhawa *et al*[9] and Manandhar *et al*,[10] and Joshi *et al*[11] too did not find significant relation between gender and difficult LC.

In our study its showed that there is signification relation between BMI and intra operative outcome. Cases with BMI >30 kg/m^2 were higher at risk for difficult LC. Study carried out by Randhawa *et al*[9] Ahmed *et al*[12] who had developed this pre-operative scoring system also indicated that BMI is one the predictors of difficult LC with p value = 0.010 and p=0.0133 respectively.

Thirty-one cases had history of hospitalization for acute cholecystitis. This study showed the significant association between history

of hospitalization for acute cholecystitis and difficult LC. This study is conformity with both Randhawa *et al*[9] and Joshi *et al*[11] Both study had indicated that history of acute cholecystitis statistically significant in prediction of difficult case with p value <0.001.

It was identified by ultrasonography of abdomen. Gall bladder wall up to 3 mm was labeled as normal gall bladder whereas more than 3 mm was considered as thickened gall bladder wall. Thickened gall bladder wall (>3 mm) was not found to be a significant predicting factor of difficult LC with p value = 0.44 similarly study conducted by Randhawa *et al*[9] which demonstrated thickened gall bladder wall (>4 mm) as predicting factor of difficult LC prior surgery. Abdominal scar due to previous abdominal surgery especially upper abdomen may pose difficulty due to unwanted adhesion around the umbilicus and peri-gall bladder area. In this study abdominal scar was found to be significant for prediction of difficulty during LC with p value 0.013. Stone size, number and distention of gall bladder and was found to be insignificant as predictors of difficult LC with p=0.62, p=0.55 and p= 0.891 in this study. This finding matched with study done by Joshi *et al*[11] and Randhawa *et al.*[9] But in a similar study, a systematic literature review of 30 studies by Hu *et al*[14] has suggested impacted stone as a high-risk factor for conversion.

This study showed that the patients with who had previous history of recurrent abdominal pain had more risk of prolongation of surgery with patients having no history of recurrent abdominal pain. The p value for this factor in this study for prediction of difficult LC was 0.033 which is significant. This result is similar to that carried out by Nachnani *et al*,[15] which showed 4.39 times more risk for prolongation of surgery in patients with previous history of recurrent abdominal pain.

The biochemical parameter; white blood cell count, among total sampled case (n=77), there was 15 cases with white blood cell count >10,000. In this study parameter was found to be insignificant with p value of 0.65 though this finding was similar to that of Randhawa *et al*[9] and Ghanem *et al*[15] whose study showed TLC as a non-significant parameter in predicting difficult LC.

In conclusion, our study revealed that factors like age, BMI, previous history hospitalization for acute cholecystitis, history of recurrent abdominal pain and history of previous abdominal surgery were helpful in predicting difficult laparoscopic cholecystectomy pre-operatively.

Other factors like gender, stone size, number of stones, GB wall distention, total leucocyte count and thickened GB wall were not so helpful risk factors in predicting the difficulty of procedure.

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