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Research Article

CLINICAL AND RADIOLOGICAL INVESTIGATIONS TO PREDICT DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT

Introduction: Gall stone disease is a very common affliction and Laparoscopic cholecystectomy (LC) is the gold standard treatment for it. Because of various factors, Laparoscopic cholecystectomy can be difficult leading to complications which can be dreadful. If we can anticipate difficulties to be encountered beforehand then one can improve preoperative patient counselling, provide for better per operative planning, optimize operating room efficiency and help avoid laparoscopic-associated complications by performing an open operation.

Aim: To identify factors which will predict difficult Laparoscopic Cholecystectomy and to review and if possible propose a scoring system based on risk factors which can predict difficulty in laparoscopic cholecystectomy.

Materials and Methods: Relevant data of symptomatic patients with USG proven gall stones who fulfilled inclusion criteria was collected on a proforma. By a scoring method, patients were graded as simple or difficult. Operative findings were noted and inference made from certain parameters to help the operating surgeon code the surgery as simple or difficult. Statistical analysis was used to assess if pre-operative assessment corresponded to intraoperative findings.

Results: 25% patients had difficult cholecystectomy which was most common in males (43%) and in age group of 21 to 40 years. Conversion to open surgery was most common in males (7%). Patients whose BMI >27.5, had tenderness over right hypochondrium and gall bladder wall thickness > 3 mm had more chances of difficult Laparoscopic cholecystectomy while duration of symptoms (>1 yr.), contracted gall bladder, number of stones or impaction of stones had no relevance to difficult surgery. Intra operative adhesions was the most common cause for conversion to open surgery.

Conclusion: BMI > 27.5kg/m2, Tenderness in RHC and GB wall thickness >3mm is risk factor in predicting difficulty in laparoscopic cholecystectomy. Advance age too acts as a risk factor in predicting difficult laparoscopic cholecystectomy. Using a predictive scoring method one can predict if a laparoscopic cholecystectomy will be difficult or not. This would help in counselling of the patient pre-operatively and make adequate arrangement pre-operatively for open surgery.

INTRODUCTION

In India gallstone disease is relatively common with an overall prevalence in the order of 10-20%[1] and predominantly a female disease.[2,3]

Cholecystectomy is the most commonly performed surgery and Laparoscopic cholecystectomy (LC) has become the gold standard treatment for gallstone disease[1] since its introduction in 1985. Through the years LC has become a relatively safe procedure though occasionally it can be difficult due to various reasons.[4]

Approximately, 2–15% of attempted LC has to be converted to an open procedure due to various difficulties faced while performing the procedure.[5]

Pre-operative assessment using clinical and radiological tools predict likelihood of difficulty in caring out LC can help in counselling patients.

Aims

1. To identify factors which will predict difficult laparoscopic cholecystectomy preoperatively.
2. To review and propose a scoring system based on clinical and radiological risk factors which can predict difficult LC and its conversion to open cholecystectomy.

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MATERIAL AND METHOD

A prospective observational study with retrospective review of 100 patients, between age of 18 to 60 years of either sex, who were diagnosed as having symptomatic cholelithiasis and were posted for routine Laparoscopic Cholecystectomy (LC) was carried out at Department of Surgery, NDMC Medical college and Hindu Rao Hospital, Delhi from June 2014 to January 2016; a period of 18 months.

Patients with altered liver function, CBD stones and other such complications, previous upper abdominal surgery and any other co-morbidities which precludes general anaesthesia were excluded.

Detailed history and investigations were collected on a printed pro forma.

Operative findings given below were used to guide the operating surgeon in classifying the surgery as Normal / Difficult.

1. Duration of surgery (<60 min or > 60 min)
2. Difficulties faced by surgeon in terms of
   i. Access into peritoneal cavity
   ii. Degree of adhesions found
   iii. Dissection of Calot's triangle
   iv. Dissection of gallbladder bed
   v. Any spillage of contents and stones
   vi. Removal of gallbladder from port site
3. Bleeding during surgery
4. Conversion to open cholecystectomy

Based on a scoring system (Table 1) by Randhawa and Pujahari[6]pre-operative scores were given to patients a day prior to surgery where a score of upto 5 was defined as easy, 6 – 10 as difficult and 11 – 15 as very difficult.

Table 1

Scoring System			
Risk Factors			**Maximum score**
Age	< 50 yrs (0)	50 yrs (1)	1
Sex	Female (0)	Male (1)	1
H/O Hospitalisation	No (0)	Yes (4)	4
BMI	<25 (0)	25-27.5 (1) >27.5 (2)	2
Abdominal scar	None (0)	Supra Umbilical (2)	2
Palpable gallbladder	NO (0)	Yes (1)	1
	Sonography		
Wall thickness	<4 mm (0)	>4 mm (2)	2
Pericholecystic collection	No (0)	Yes (1)	1
Impacted stone	No (0)	Yes (1)	1
Duration of symptoms	<6 month (0)	6 month (1)	1
Tenderness in Rt.Hypochondrium	No (0)	Yes (1)	1

RESULTS

Symptomatic cholelithiasis was seen in women (93%) with almost 69% in the age group of 21 to 40 years. 25% patients had difficult cholecystectomy which was most common in males (43%) and in age group of 21 to 40 years. Of the 25% difficult cases, conversion rate to open surgery was 7% while 18% could still be done by laparoscopy. Conversion was more in males (14%) than in females (6%) and in age group of 21 to 30 years. Most cases (60%) undergoing surgery had a normal BMI (<25) but those with difficult LC had a BMI >27.5kg/m^2. It was noted that duration of symptoms (>1 yr.) had no bearing on difficulty of surgery. Tenderness over RHC correlated well with difficult LC but surprisingly a palpable GB had no importance in predicting difficult LC but a contracted GB on USG had no bearing on difficulty of LC. Wall thickness (>3mm) on USG had a definite relation to difficult LC while size or number of stones or impaction of stone did not correlate to difficult LC. Intraoperative, adhesions was the most common cause for difficult LC.

On statistical analysis of scoring system it was found that the scoring system was statistically significant in predicting difficult LC with sensitivity of 40%, Specificity of 100% with a p value of <0.001. The score also correlated well with the surgeons assessment of easy or difficult LC; 75 patients who were classified as simple (score<5), all were classified by surgeons too as simple LC while the rest 25% who were classified as difficult, 15 i.e.60% were classified as simple by the surgeon while rest 40% correlated to pre-op score of >5 (difficult LC). It was found that if the scoring system was modified to simple cases <3 then sensitivity of the scoring system increased to 72%

Based on the above scoring system as proposed by Randhawa and Pujahari[6] pre-operative scores given to patient one day prior to surgery. Score upto 5 was defined as easy, 6–10 as difficult and 11–15 as very difficult as per original score but in my study previous hospitalization was not taken instead duration of symptoms, tenderness in right hypochondrium, size and number of calculi were studied as other risk factors. At the end of study scoring system will be reviewed and new risk factors will be proposed based on the significant 'p' values. Previous H/o hospitalization was not assessed in our study (so max score of patients reaches up to 11) instead various new USG factors were assessed as predictive factors.

Statistical Analysis

Statistical analysis was performed by the SPSS program for Windows, version 17.0. Continuous variables are presented as mean ± SD, and categorical variables are presented as absolute numbers and percentage. Normally distributed continuous variables were compared using the unpaired t test, whereas the Mann-Whitney U test was used for those variables that were not normally distributed. Categorical variables were analysed using either the chi square test or Fisher's exact test. For all statistical tests, a p value less than 0.05 was taken to indicate a significant difference.

RESULTS

Cholecystectomy was most commonly performed in women (93%) with almost 69% in the age group of 21 to 40 years. 25% patients had difficult cholecystectomy which was most common in males (43%) and in age group of 21 to 40 years. Of the 25% difficult cases, conversion rate to open surgery was 7% while 18% could still be done by laparoscopy. Conversion was more in males (14%) than in females (6%) and in age group of 21 to 30 years. Most cases (60%) undergoing surgery had a normal BMI (<25) but those with difficult LC had a BMI >27.5kg/m^2. It was noted that duration of symptoms (>1 yr) had no bearing on difficulty of surgery. Tenderness over RHC

correlated well with difficult LC but surprisingly a palpable GB had no importance in predicting difficult LC but a contracted GB on USG had no bearing on difficulty of LC. Wall thickness (>3mm) on USG had a definite relation to difficult LC while size or number of stones or impaction of stone did not correlate todifficult LC. Intraoperative, adhesions was the most common cause for difficult LC.

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DISCUSSION

The mean age for Gall stone disease undergoing surgery was 34.26 years but mean age of patients undergoing normal LC was 32.64 years which was less than the mean age for patients undergoing difficult LC which was 39.2 years. This was also observed by Brodsky *et al*[7] in his study and proposed advanced age as a risk factor. Statistical significant p value 0.005 was observed for mean age of 39.12 ± 10.65 as a predictive factor of difficult LC. Probable reason could be that elderly patients have a longer history of gallbladder disease with more episodes of acute attacks causing fibrotic adhesions. In our study, we did not find any positive correlation between age of the patient and complications (p 0.222). Similar was the findings of Edward H. Livingston etal[8]. They found very little correlation between age and the need to convert to an open operation for difficulties faced by surgeon.

In our study an overwhelming majority were females (13.2:1) though in literature it was 4.5:1[9] sex had no statistical bearing on predicting difficult LC.

BMI>27.5 was statistically significant for predicting difficult LC compared to 25.3% cases of normal cholecystectomy with significant P value 0.011 which compared to Hussien *et al*[10]Duration of symptoms too did not have any bearing in predicting difficult LC and so did lower abdominal surgery both corroborated with studies by Akyurek *et al*[11]and Fanaei *et al*[12] .From these studies, higher conversion rates as well as a longer hospital stay for patients with previous upper abdominal surgery than for those without previous upper abdominal surgery were detected.

Statistical analysis showed tenderness in right hypochondrium has a significant predictive property for difficult with P value < 0.001. Tenderness in RHC may signify on going inflammation it could be due to subacute cholecystitis or resolving inflammation. This may lead to complications such as bleeding from surrounding tissues. Results of our study were comparable to Lo et a1[13] study who concluded increased operative time in this group and Merdad *et al*[14] who observed increased frequency of conversion in this group.

A palpable GB on statistical analysis didn't showed any clinical significance as a predictive factor in my study (P value 0.061) unlike the study by Hinduja *et al* (2008)[15]. This could be due to absence of palpable GB in all 25 cases of normal LC while presence of only 2 cases of palpable GB in difficult LC.
USG finding of thickened GB wall >3 mm was statistically significant (P value <0.001) in predicting difficult LC. The same was noted by Rosen *et al*[16] in his study which concluded that a body mass index more than 40 kg/m^2 and a wall thickness more than 0.4 cm predicted intraoperative difficulties and conversion.

GB shape (contracted / distended), size of stone (<1cm or > 1cm), number of stone or even impaction of stone had no bearing in predicting difficult LC as p value was 0.082. This result resembles study conducted by Carmody E, etal[17] and Santambrogio R, *et al*[18] in which stone impaction is shown to have a moderate correlation.

Amongst intra-operative risk factors adhesions were the most common cause of difficult LC which was similar to Tayab *et al*[19] who concluded most common cause for conversion in both genders were dense adhesions in 41(56.2%) followed by an empyema of the gall bladder in 9(12.2%), obscure anatomy in 14 cases (19.2%), preoperative finding of common bile duct stone in 5(6.9%), and of common bile duct injury in 2(2.7%).

Conversion rate in our study was 7%; about 50% of these cases had adhesions as intra-operative risk factor for conversion which is similar to the results proposed by Kaplan *et al*[20.] who reported a conversion rate of 7.7% and also reported that the most common reason was inability to proceed with laparoscopic dissection due to dense adhesion.

Statistical evaluation of our scoring systemwas compared to that of Randhawa and Pujari[6]and it was found that age>50 years and sex had no significance and so did previous abdominal surgery and palpable GB. But BMI >27.5 and GB wall thickness > 3mm had statistical significance (p <0.001). Other new factors were evaluated such as duration of symptoms, tenderness in RHC, shape of gallbladder, size and number of calculi. All these factors were found to be statistically insignificant except Tenderness in RHC which was found to be a predictive risk factor with P value < 0.001.

CONCLUSION

It was concluded that BMI > 27.5kg/m^2, Tenderness in RHC and GB wall thickness >3mm is risk factor in predicting difficulty in laparoscopic cholecystectomy. Mean age of patients in difficult group is more than mean age of normal group in my study so it can also be concluded that advance age acts as another risk factor in predicting difficult laparoscopic cholecystectomy. New proposal for scoring system is to reduce cutoff value for normal cases < 3 to increases its sensitivity to 76% from 40% and to add tenderness as a risk factor.

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