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ORIGINAL ARTICLE

Preoperative scoring system in predicting difficulty in laparoscopic cholecystectomy.

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ABSTRACT… Objective: To evaluate a scoring system in predicting difficulty in laparoscopic cholecystectomy. **Study Design:** Non-Randomized Prospective study. **Setting:** Surgical Unit-1 of Holy Family Hospital, Rawalpindi. **Period:** January 2018 to September 2018. **Material & Methods:** Patients with symptomatic gallstone disease that were admitted in SU-1 of Holy family hospital during the above period were included in the study. For collection of data, a pre-tested questionnaire was used after taking informed oral consent. On admission, one day before the surgery, preoperative points were allotted on basis of patient's history, examination, hematological (CBC), biochemical (LFTs) and ultrasound results. Preoperative scores up to 5 was summed up as easy, scores 6 – 10 as difficult, 11 – 16 as very difficult. Calculated sample size was 229. SPSS version 22 and WHO Anthro calculator version 3.2.2 were used for data entry and analysis. **Results:** Among 230 patients that were included in the study, 188 were female and 42 were male. Various risk factors were found to have significant positive correlation with intraoperative difficulty during cholecystectomy. These are: Previous episodes of cholecystitis and pancreatitis ($p=0.00$), ERCP ($p=0.00$), tenderness in right hypochondrium ($p=0.002$), hepatitis serology ($p=0.02$), and Total Leukocyte Count ($p=0.006$). Whereas the following factors had insignificant relation with intraoperative difficult cholecystectomy: ALT and ALP ($p>0.05$, $p=0.06$ and 0.26 respectively) and hepatits serology ($p=0.406$). A significant correlation was found between preoperative and intraoperative scores of the patients ($p=0.003$) indicating that preoperative assessment of various risk factors can predict the level of difficulty of cholecystectomy and its conversion to open cholecystectomy. **Conclusion:** We may conclude that the scoring system evaluated in our study is a sturdy, reliable and useful benchmark to predict difficult cases. Preoperative prediction of the risk factors of conversion or difficulty of operation is an important point for operative planning and the high-risk patients may be informed accordingly.

Key words: Gall Bladder, Laparoscopic Cholecystectomy, Total Lymphocyte Count, Ultrasound Abdomen.

INTRODUCTION

For a long time now, laparoscopic cholecystectomy (LC) has been the gold standard treatment for gallstone disease.[1] Having said that, approximately 2–15% of attempted LCs have to be converted to an open procedure due to various difficulties faced while performing the procedure.[2] Age >60 years, male gender, pre-operative upper abdominal tenderness, upper abdominal scar of previous surgery, thick gallbladder wall on abdominal ultrasound, and preoperative acute cholecystitis had significant risk of conversion on multivariate analysis.[3,4]

This study has been structured and planned taking into account the various difficult situations a laparoscopic surgeon faces during laparoscopic cholecystectomy and assigns an objective outlook to the difficulty in the form of a difficulty score. A better understanding of the risk factors that herald a difficult cholecystectomy has been the aim of every surgeon even before laparoscopy was invented but now the need has increased because although laparoscopic cholecystectomy has many advantages for the patients, the surgeons trained in open procedures still find it difficult to master. With the help of accurate prediction, high risk patients would be informed beforehand, scheduled for longer

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hospitalization and more intensive post-operative care. Surgeon would also be prepared before-hand and proper consultant cover would be there to manage any per-operative complication. Hospital administration would plan and predict admissions and bed vacancy.

The objectives of this study are to predict difficult laparoscopic cholecystectomy preoperatively using a scoring system, to determine the association of various risk factors with degree of difficulty encountered during the procedure and to corelate the pre-operative scores with actual level of difficulty during the procedure.

MATERIAL & METHODS

It was a non-randomized prospective study carried out in surgical unit-1 of Holy family hospital, Rawalpindi for a period of nine months from January 2018 to September 2018 after approval from ethical committee (IRF/012/RMU). Patients with symptomatic gallstone disease that were admitted in SU-1 of Holy family hospital during the above period were included in the study.

Patients with carcinoma gallbladder, choledocholithiasis, dilated CBD or patients with current attack of acute cholecystitis or patients unfit for anesthesia and patients in which lap cholecystectomy was converted to open cholecystectomy due to equipment failure were excluded from this study.

For collection of data, a pre-tested proforma was used after taking informed oral consent.

On admission, one day before the surgery, preoperative points were allotted on basis of patient's history, examination, hematological (CBC), biochemical (LFTs) and ultrasound results. Preoperative scores up to 5 were summed up as low risk, scores 6 – 10 as high risk, 11 – 16 as very high-risk scores.

All cases were operated by experienced surgeons having more than 20 years' experience in laparoscopic and general surgery. Surgery was done as patient placed in lying face upwards position, surgeons stand on the left side of the patient. Pneumo-peritoneum set up by using CO_2 gas with pressure of 10 mm Hg. Traditional 4 ports were inserted. Surgery time was calculated from insertion of first trocar up to the time of the stitch of last trocar opening.

Entire per-operative happenings, time of procedure and level of quoted difficulties were estimated by the 2nd assistant, and the level of surgery was interpreted at the end of procedure on hospital postoperative notes and labeled as easy, difficult and very difficult by the surgeons.

The Scoring System

The score in our study is based on the system devised by Gupta et al depending on patient's history, clinical data and ultrasound findings.[7] On the basis of score, patient is categorized into low risk (0-5), medium risk (6-10) and high risk (11-15) for difficult cholecystectomy.

Parameter	Score	Maximum
History		
Age ≤50 yr >50 yr	 0 1	1
Gender Male Female	 0 1	1
History of hospitalization for acute cholecystitis Yes No	 2 0	2
Previous history of ERCP Present Absent	 1 0	1
Tender RHC Present Absent	 2 0	2

Parameter	Score	Maximum
TLC		2
less than 10,000/cmm^3	0	
Between 10 to 15 x 10^3/cmm^3	1	
More than 15 x 10^3/cmm^3	2	
LFT'S		
ALT and alkaline phosphatase both deranged.	2	1
Normal LFT's	1	
Viral serology for Hep B and C		
Positive	1	1
Negative	2	

Parameter	Score
Contracted gallbladder	0
Distended gallbladder with stones	1
Distended gallbladder with liver cirrhosis	2

Ultrasound findings.

Calculated sample size was 230. SPSS version 22 and WHO Anthro calculator version 3.2.2 were used for data entry and analysis. For continuous variables, means and standard deviations were calculated. For categorical variables, frequencies and proportions were calculated.

To determine any existing statistical association, Chi square test at 5% level of significance was applied. For dichotomized variables where Chi - square test was not applicable due to deficient expected count in more than 10% of cells of cross tabulation, Fisher's exact test was applied at 5% level of significance. P-value of less than 0.05 was taken as statistically significant.

RESULTS

Among 230 patients that were included in the study, 188 were female and 42 were male. The mean age of patients was 43.28. Age of 52 patients was greater than 50 years and 178 patients were aged less than 50 years. One hundred and fifty-three had BMI less than 25, whereas 15 patients had BMI between 25-27.5 and 42 patients had BMI greater than 27.5. There was positive history of prior hospitalization of 60 patients only.

Various risk factors were found to have significant positive correlation with intraoperative difficulty during cholecystectomy. These are: Previous episodes of cholecystitis and pancreatitis (p=0.00), ERCP (p=0.00), tenderness in right hypochondrium (p=0.002), and Total Leukocyte Count (p=0.006). Whereas the following factors had insignificant relation with intraoperative difficult cholecystectomy: ALT and ALP (p>0.05, p=0.06 and 0.26 respectively) and hepatitis serology (p=0.406).

Parameter	Score
Distended gallbladder	1
Adhesions	2
Cystic Artery and duct anomalies	
Present	1
absent	0
Bleeding from GB fossa	
Present	1
Absent	0
Duct and artery ligation time	
<15min	0
15-30 min	1
>30min	2
Surgery time	
<30min	0
30-60min	1
>1 hour	2
Need to call in consultant	
Yes	2
No	0
Need to convert to open procedure	
Yes	0
No	2
Distended gallbladder	1
Adhesions	2
Cystic Artery and duct anomalies	
Present	1
absent	0
Bleeding from GB fossa	
Present	1
Absent	0
Duct and artery ligation time	
<15min	0
15-30 min	1
>30min	2
Surgery time	
<30min	0
30-60min	1
>1 hour	2
Need to call in consultant	
Yes	2
No	0
Need to convert to open procedure	
Yes	0
No	2
Distended gallbladder	1
Adhesions	2
Cystic Artery and duct anomalies	
Present	1
absent	0
Bleeding from GB fossa	
Present	1
Absent	0
Duct and artery ligation time	
<15min	0
15-30 min	1
>30min	2
Surgery time	
<30min	0
30-60min	1
>1 hour	2
Need to call in consultant	
Yes	2
No	0

Intra operative scoring.

A significant correlation was found between preoperative and intraoperative scores of the patients (p=0.003) indicating that preoperative assessment of various risk factors can predict the level of difficulty of cholecystectomy and its conversion to open cholecystectomy.

Variable		Frequency	Percentage (%)
Tenderness in RHC	Yes No	128 102	55.7 44.3
Quantity of stones	Single Multiple	181 49	78.6 21.3
Gall bladder on USG	Distended Contracted	186 44	80.9 19.1
Hepatitis Serology	Positive Negative	206 24	89.6 10.4
Pericholecystic Fluid	Present Not Present	20 210	8.7 91.3
Gall Bladder intraoperatively	Normal Distended Contracted Shrunken/ fibrosed	2 164 46 18	0.9 71.3 20.0 7.8
Conversion to open Surgery	Yes No	42 188	18.3 81.7
Age	<50 years >50 years	178 52	77.4 22.6
Preoperative Score	Easy Moderately Difficult Very Difficult	152 74 4	66.1 32.2 1.7
Intraoperative Score	Easy Moderately Difficult Very Difficult	120 98 12	52.2 42.6 5.2

DISCUSSION

Predicting a difficult gallbladder operation pre-operatively has become a dilemma in surgery for the past few decades especially after integration of laparoscopic cholecystectomy as the standard procedure for cholelithiasis. Many studies done in the past have proposed various scoring system, but none has achieved worldwide acceptance.

Regarding assessment of individual risk factors, in our study greatest co relation with a difficult cholecystectomy has been found with previous history of acute cholecystitis, pancreatitis and previous history of ERCP. A relative lower risk was associated with pre-operative ALT, ALP and viral serology which is relatively in contradiction to previous studies.

In the study conducted by Rhandava et al, a similar scoring system was devised to predict difficult cholecystectomy with previous history of hospitalization, BMI greater than 25, supra umbilical scar and wall thickness of gallbladder greater than 4 mm carrying the maximum score for difficult laparoscopic cholecystectomy. It was a prospective study and multivariate analysis showed statistically significant co relation with BMI >27.5, palpable gallbladder, previous hospitalization and sonological wall thickness of gallbladder more than 4mm. Although the study's parameters for predicting difficulty are somewhat different from ours but some of the parameters like tender hypochondrium and gallbladder wall thickness have a similar co relation to our study.[5]

More recently retrospective study conducted by Bourgouin et al has proposed a similar scoring system for predicting difficulty using 5 pre- op measures i.e. gender, neutrophil count, fibrinogen levels, alkaline phosphatase levels and previous attack of acute cholecystitis.[6] Their results showed that each of these 5 parameters were independent predictors of difficult cholecystectomy and although their study parameters are somewhat different from our study, but a positive relation can be found regarding neutrophil count (TLC count in our study) and attack of acute cholecystitis. Similarly, Gupta et al proposed that 4 variables were independent risks for difficult cholecystectomy namely previous hospitalization, palpable GB, thick walled GB and impacted stones.[7]

A systemic review of 30 studies carried out by Hu et al for predicting risk factors leading to conversion of laparoscopic to open procedures, revealed that high BMI, gallbladder wall thickness greater than 4mm, impacted stone and previous history of surgery had the highest positive correlation with conversion, While male gender, age >50 and high TLC count were statistically significant for conversion in a minority of the studies. None of the studies evaluated previous history of acute pancreatitis and only 2 studies evaluated previous history of ERCP as a risk factor for conversion,

both parameters are significant according to our study in predicting difficult cholecystectomy.[8] Studies carried out by Goonawardena et al and Rothman et al for risk factors in conversion to open surgery also revealed similar results.[9,10] But the sample size used in this study may be too small to advocate global acceptability, so we propose large scale, multi central studies to validate the scoring methodology and establish its efficacy.

CONCLUSION

The scoring system used in this study was able to successfully predict difficult laparoscopic cholecystectomies. However, we can safely conclude from this study that assessment of the difficulty of cholecystectomy should be assessed in the pre-operative period and these cholecystectomies should be performed by experienced surgeons and the patients should also be informed of the risk of conversion to an open procedure.

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