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"Assessment of Intraoperative First Port Findings for Predicting Difficulty Levels during Laparoscopic Cholecystectomyby ICHBS Scoring System"

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Abstract

CONTEXT

Laparoscopic Cholecystectomy (LC) is the gold standard management for Gallstones disease. This is continuously evolving and this article is an attempt to assess the difficulty levels for LC in an objective manner and to introduce a part of a scoring system –"ICHBS Score" and accordingly proper recommendations for surgical technique to be adopted as per difficulty levels Ia, Ib, IIa, IIb, andIII for safe cholecystectomy.

MATERIAL&METHODS

The study was conducted from October 2016 to September 2018 (n=192)to study "clinico-radio-pathological parameters that can predict intra-operative difficulty levels during laparoscopic cholecystectomy" in patient's admitted through surgery outpatient department / Emergency / transferred from other departments for gallstone disease in Subharti medical college, Meerut, UP, INDIA after taking clearance from Institutional Ethical Committee.

All the patients were operated in a single tertiary care hospital.Patients satisfying the inclusion and exclusion criteria were included in the study and they underwent laparoscopic cholecystectomy and proposed ICHBS scoring system was applied to analyse and co-relate the pre-operative factors and intra operative first port findings to decide the operating difficulty level (Level Ia , Ib, IIa, IIb, III) during laparoscopic cholecystectomy for gall bladder disease and formulation of recommendations for surgical management of gall bladder disease according to operating difficulty level was done.

STATISTICAL ANALYSIS USED

Univariate statistical analysis was performed using Chi- Square test via SPSS 25.0 software. A correlation matrix was developed to evaluate co relation between individual parameters as well as intra operative first port laparoscopic findings with level of operative difficulty and its recommendations (ICHBS scoring system).

RESULT

We have found statistically highly significant correlation between preoperative and intraoperative predictive parameters with operative difficulty levels Ia , Ib, IIa, IIb and III and its surgical technique recommendations outcome with'p'- value = 0.000.

CONCLUSION

The ICHBS scoring is a very reliable system for safe LC and statistically significant outcome for safe cholecystectomy was observed following recommendations as per difficulty levels (Ia, Ib, IIa, IIb and III) for managing the gall stones/ acalculouscholecystitispatients. According to the ICHBS scoring system(minimum=0; maximum=40), the difficulty levels for laparoscopic cholecystectomy can be assessed combining preoperative as well as intraoperative first port findings by using an objective score and appropriate operative recommendations for that difficulty level can be obtained and practiced for safe cholecystectomy.

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I. Introduction

Till now, many studies have been done regarding predictive pre-operative markers for difficult cholecystectomy in Gallbladder stone disease [1] but very few studies have pointed over the role of intraoperative first port laparoscopic findings in deciding difficulty levels and its role in decision making and there is no research data/objective guidelines available in the literature focussing on combining preoperative and intraoperative parameters in an objective manner that can be easily predicted and used. This study is an attempt to fulfil the gap in surgical literature in the form of an ICHBS score, which is having statistically significant outcome, performing a safe cholecystectomy as per the various designed difficulty levels Ia, Ib, IIa, IIB, III in an objective manner. This is an attempt to exclude the subjectivity in assessment and operative management decision making of gall stones disease patients. This study also helps us to compare and use the world wide data regarding LC in an objective manner for future research in this field.

AIMS –

1.To assess intraoperative difficulty levels during laparoscopic cholecystectomy by using intra operative first port findings as predictive parameters.

2.To co-relate the intra-operative difficulty level during laparoscopic cholecystectomy with the Histo-pathological reports.

II. Material

The study was conducted from October 2016 to September 2018 onpatients admitted through surgery outpatient department / Emergency / transferred from other departments for gallstone disease in Subharti medical college, Meerut, UP, INDIA after taking clearance from Institutional Ethical Committee.

We had selected patients according to inclusion and exclusion criteria

Inclusion Criteria

Case of acute or chronic cholecystitis with cholelithiasisand Patient giving informed consent for operative intervention.

Exclusion criteria:

Age below 10 years, viral marker positive patients (HBs Ag, HCV, HIV 1 &HIV2), Pregnancy, patients not fit for general anaesthesia due to various medical illnesses, Bleeding disorders, and Patient not giving informed consent.

III. Methods

The patients were worked up thoroughly and subjected to detailed history and clinical examination. Routinehaematological investigation CBC, KFT, LFT, Viral markers, USG abdomen for hepatobiliary region and ECG were done. ICHBS score calculation was done for every patient and recorded.

IV. Results

Majority of patients were presented in middle age group i.e. 36-45 years of age, were females 72%. The most common presenting symptom was pain abdomen[2] seen in 164 patients. The patients having positive Murphy's sign were 19.7% and 57% patients had abnormal LFT. Our study also showed that patients with recurrent abdominal pain lead to adhesions which resulted in difficulty in identification of Calot's triangle and further made Gall bladder dissection difficult during laparoscopic cholecystectomy. The co-morbidities like Diabetes Mellitus and Hypertension lead to increased intra operative bleeding which made GB dissection difficult.

The dissection of Calot's triangle was done via Maryland in 51.56% patients where as in 6.77% patients it was done via hook , in 9.89% patients it was done via suction cannula and in 61 (31.77%) patients dissection was done with the help of gauze piece. The factors which pre-operatively predict the difficulty in laparoscopic cholecystectomy in elective cases were: " Advanced Age, Male Gender, History of hospitalization for acute cholecystitis /Gall stone pancreatitis/Alcoholic pancreatitis within 3 months , Post ERCP with CBD stent or without CBD stent, Previous Abdominal Scar , Clinically palpable gall bladder, [3] Bio-Chemical factors were elevated lipase/amylase/both within last 2 weeks, Deranged L.F.T., Elevated Leukocytes Counts, Sonographic parameters which were Wall thickness, pericholecystic fluid collection, impacted stone, cirrhotic liver.

First port intra operative findings (Gallbladder Factors) were whether gall bladder visualized out of liver margin >3cm or not, adhesions of gall bladder with greater omentum , colon, duodenum or stomach , Calots triangle posterior fold visualization , excessive fat over Calot's triangle , whether gall bladder was distended , empyema/mucocele gall bladder or contracted fibrosed gall bladder. First port intra operative

findings (Hepatic Factors) were presence or absence of Rouvier's sulcus , presence of peri hepatitis and adhesions ,Whether neck of gall bladder present inferio-medial to Rouvier's sulcus after retraction of liver, presence of anomalous congenital defects of hepato- arteriobiliarytree. Taking into account all the above factors we have proposed the "ICHBS (Intraoperative Clinical Hepato-Biliary Score) scoring system" to decide the intra-operative difficulty levels and associated recommendations for surgical intervention during laparoscopic cholecystectomy.

TABLE – 1 ICHBS (Intraoperative Clinical Hepato-BilliaryScore) predicting intra-operative difficulty level during laparoscopic cholecystectomy

Scoring Factors	Minimum	Maximum	Score
History			
1. Age	≤40 years (0)	>40 years (1)	
2. Gender	Female (0)	Male (1)	
3. History of hospitalization for acute cholecystitis /Gall stone/Alcoholic pancreatitis within 3 months	No (0)	Yes (4)	Minimum=0 Maximum=8
4. Post ERCP – with CBD stent	No(0)	Yes(1)	
Without CBD stent	No (0)	Yes (2)	
Clinical			
1. Previous Abdominal Scar	No(0)	Infra-Umbilical (1) Supra-Umbilical(2)	Minimum=0 Maximum=3
2. Palpable Gall Bladder	No(0)	Yes(1)	
Bio-Chemical Parameters			
1. H/S/O Elevated lipase/amylase/both within 2 weeks	No(0)	Yes(1)	Minimum=0 Maximum=4
2. Deranged L.F.T.	No(0)	Yes(1)	
3. Elevated Leukocytes	No(0)	Yes(2)	
Sonographyhepato biliary system			
1. Wall Thickness	≤3mm(0)	>3mm(1)	
2. Pericholecystic fluid collection	No(0)	Yes(1)	Minimum=0
3. Impacted Stone	No(0)	Yes(1)	Maximum=5
4. Cirrhotic Liver	No(0)	Yes(2)	
Intraoperative first port finding (laparoscopic view) without corrective intervention			
Gall bladder factors			
1. Gall bladder visualised out of liver margin > 3 cm	Yes (0)	No (1)	
2. Adhesions with gall bladder			
(a) Greater omentum	No(0)	Yes(1)	
(b) Colon or colon + (a)	No(0)	Yes(2)	
(c) Duodenum or Duodenum + (b)	No(0)	Yes(3)	Minimum=0
(d) Stomach or Stomach + (c)	No(0)	Yes(4)	Maximum=10
3. Calot's Triangle posterior fold visualisation	Yes (0)	No (2)	
4. Excessive fat over calot's triangle	No (0)	Yes (1)	
5. Gangrenous / Distended with empyema / mucocele Gall bladder / contracted fibrosed gall bladder	No (0)	Yes (2)	
Hepatic factors			
(1) Rouvier's Sulcus presence	Yes(0)	No(1)	
(2) Presence of peri hepatitis	No(0)	Yes(1)	
(3) Neck of Gall bladder presenting inferio-medial to rouvier's sulcus after retraction of liver	No(0)	Yes(4)	Minimum=0 Maximum=10
(4) Anomalous congenital presentation of hepatoarteriobiliary tree.	No(0)	Yes(4)	

TABLE – 2 - Difficulty levels as per ICHBS Scoreand its possible combinations of symptoms.

	MILD Difficulty (LevelI)	**MODERTEDifficulty (Level II)**	**SEVEREDifficulty (Level III)**
PRE-OPERATIVE ASSESSMENT			
HISTORY	AGE + SEX + WITH CBD STENT	AGE +SEX + WITHOUT CBD STENT	----------
CLINICAL	PREVIOUS ABDOMINAL SCAR (INFRA UMBLICAL)	PREVIOUS ABDOMINAL SCAR(SUPRA UMBLICAL) + PALPABLE GALL BLADER	----------
BIOCHEMICAL	H/S/O BOTH DERANGED LIPASE/AMYLASE + DERANGED LFT	H/S/O BOTH DERANGED LIPASE/AMYLASE + DERANGED LFT + ELEVATED LEUKOCYTES	----------
SONOGRAPHY	WALL THICKNESS + PERICHOLECYSTIC	WALL THICKNESS + PERICHOLECYSTIC FLUID	WALL THICKNESS + PERICHOLECYSTIC FLUID

	FLUID COLLECTION	COLLECTION + IMPACTED STONE	COLLECTION + IMPACTED STONE + CIRRHOTIC LIVER
INTRAOPERATIVE ASSESSMENT			
GALLBLADDER FACTORS	GALLBLADDER VISUALIZATION OUT OF LIVER MARGINS > 3CM.	GALLBLADDER VISUALIZATION + ADHESION WITH GALLBLADDER(GREATER OMENTUM/ GREATER OMENTUM +COLON) + CALLOTS TRIANGLE POSTERIOR FOLD VISUALIZATION	GALLBLADDER VISUALIZATION + ADHESION WITH GALLBLADDER (DUODENUM / DUODENUM + STOMACH) + CALLOTS TRIANGLE POSTERIOR FOLD VISUALIZATION + EXCESSIVE FAT OVER CALOTS TRIANGLE + GANGRENOUS/DISTENDED WITH EMPYEMA/MUCOCELE GALLBLADDER/CONTRACTED GALLBLADDER
HEPATIC FACTORS	ROUVIER'S SCULCUS ABSENT	ROUVIER'S SCULCUS ABSENT + PRESENCE OF PERIHEPETITIS + NECK OF GALLBLADDER PRESENTING INFEROMEDIALLY TO ROUVIERS SCULCUS AFTER RETRACTION OF LIVER	ROUVIER'S SCULCUS ABSENT + PRESENCE OF PERIHEPETITIS + NECK OF GALLBLADDER PRESENTING INFEROMEDIALLY TO ROUVIER'S SCULCUS AFTER RETRACTION OF LIVER + ANOMALOUS CONGENITAL PRESENTATION OF HEPATO VASCULO-BILIARY TREE

Recommendations of ICHBS in Management of Gallbladder Diseases requiring Laparoscopic Cholecystectomy -

1. For level I Difficulty, maximum score provided was 10. Level I was divided in the following manner with surgical intervention recommendations -

a. Laparoscopic cholecystectomy without extra port insertion and score range provided was from 0-5. (Ia = n=68)

b. Laparoscopic cholecystectomy with or without extra port insertion and score range provided was from 6-10. (Ib = n=27)

2. For level II Difficulty, maximum score provided was 30 and level II was divided in the following manner with surgical intervention recommendations-

a. Laparoscopic cholecystectomy with extra port insertion and score range provided was from 11-20. (IIa = n = 23)

b. LC or Laparoscopic subtotal cholecystectomy type I or type II or type III with endo suturing or endoknotting and score range provided was from 21-30. (IIb = n= 35)

3. For level III Difficulty, maximum score provided was 40 - laparoscopic subtotal cholecystectomy type I or type II or type III with fundus first method with endosuturing or endoknotting / endoligature / open conversion is recommended.(III = n=39)

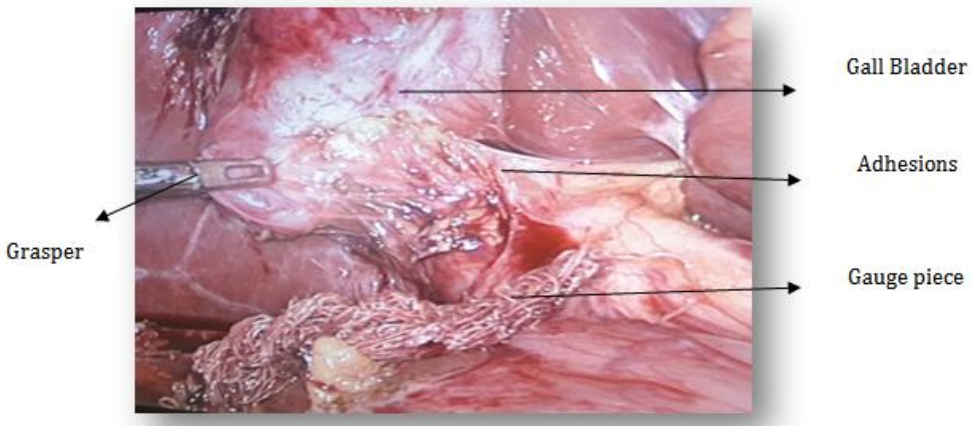

FIGURE- 1 : Dense fibrosis and adhesions in peri hepatocellular region corresponds to level III Difficulty according to ICHBS score. (Intraoperative view)

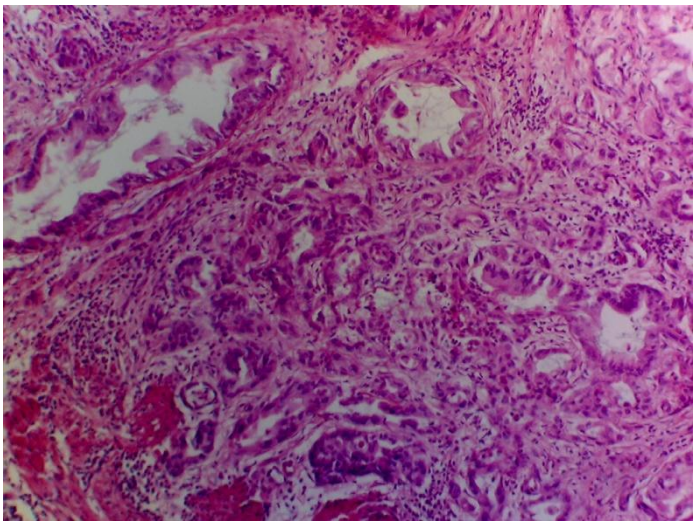

FIGURE-2: Infiltrating atypical glands in adenocarcinoma detected in postoperative period correlating with level III difficulty according to ICHBS scoring system (H&E X 100)

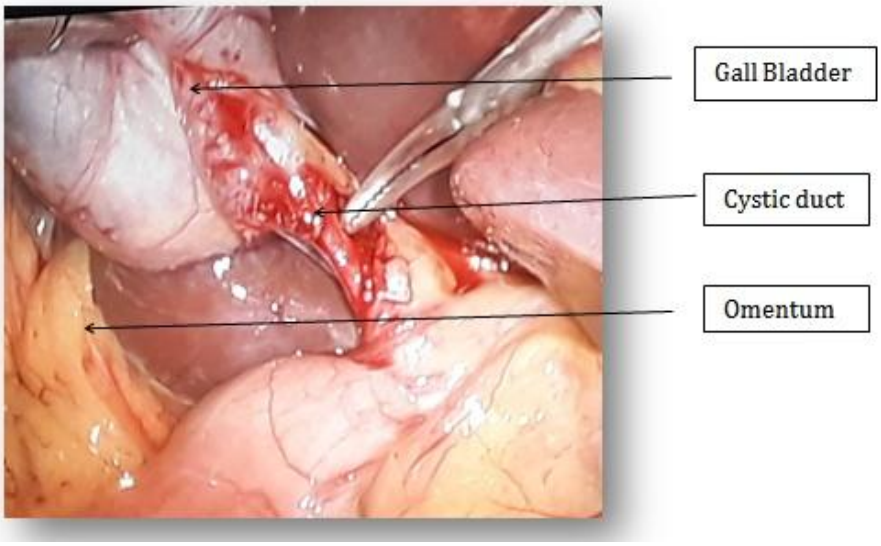

FIGURE-3:Adhesions with omentumcorrelating with level Ib difficulty according to ICHBS scoring system (Intraoperative view)

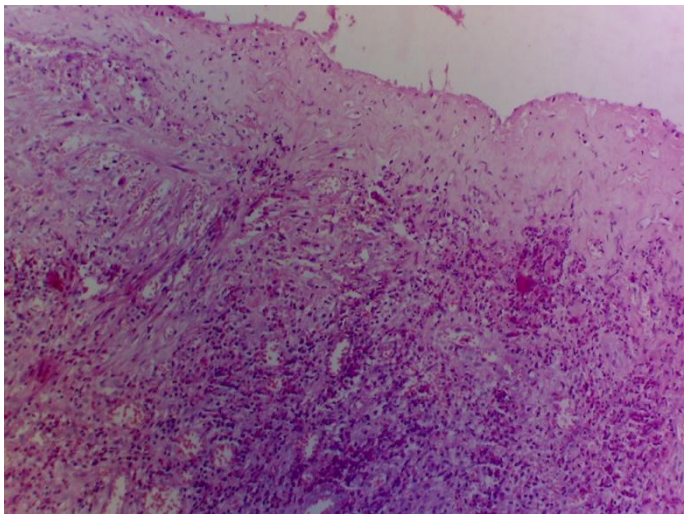

FIGURE-4: Case of chronic cholecystitis exhibiting fibrosis and lymphoplasmacytic infiltrate correlating with level IIb difficulty according to ICHBS scoring system (HE X 100)

V. Conclusion

The ICHBS scoring is a very reliable system for performing safe LC and statistically significant outcome for safe cholecystectomy was observed following recommendations as per difficulty levels (Ia, Ib, IIa, IIb and III) for managing the gall stones/ acalculouscholecystitis patients. According to the ICHBS scoring system(minimum score=0; maximum score=40) we have introduced for the first time , the difficulty levels for laparoscopic cholecystectomy can be assessed combining preoperative as well as intraoperative first port findings by using an objective score and appropriate operative recommendations for that difficulty level can be obtained and practiced for safe cholecystectomy.

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