

## Role of ICHBS Score during Laparoscopic Cholecystectomy for safe outcome

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**Abstract:Background:** Laparoscopic cholecystectomy (LC) is the current gold standard for treatment of symptomatic gallstone disease. Despite all the advances in the field of laparoscopic surgery since its introduction, no clear set of preoperative and intraoperative parameters can determine the outcome of the surgery. This Study aims to evaluate the role of a new objective scoring system (ICHBS scoring system) based on various preoperative factors and intraoperative first port findings to allow grading of the findings and standardize the levels of difficulty and applying its recommendations for safe outcome.

**Materials and Methods:** This prospective study was conducted over a period of 8 months from 1<sup>st</sup> April 2019 to 30<sup>th</sup> November 2019 in the Department of Surgery of a tertiary care institute. As per the study protocol, 224 consecutive patients were enrolled for the study. All patients who fulfilled the inclusion criteria had their ICHBS score calculated either manually or from the 'GALLBLADDER WALK' Application available on android and iOS operating system. Following written informed consent, all patients underwent standard 4 port laparoscopic cholecystectomy with or without extra port insertion/subtotal cholecystectomy/open cholecystectomy based on the recommendations of ICHBS under general anesthesia.

**Result:** The study group consisted of 224 consecutive patients with the mean age of the study group being 39 years. 36 patients of the study group were males while 188 were females with male: female ratio being 1:5. As per the recommendations of ICHBS scoring system the patients were grouped in various difficulty levels and underwent laparoscopic cholecystectomy/ Subtotal Cholecystectomy/ Open Cholecystectomy based on the recommendations. Out of the 224 patients included in the study, One(1) patient had hemorrhage from cystic artery and Two(2) patients had bile duct injury which was repaired over T-Tube. Eleven (11) patients were converted to open procedure and there was zero mortality.

**Conclusion:** The ICHBS scoring system is an extremely effective and free tool in treatment of symptomatic gallstone disease and its application is recommended in all patients planned for LC. It can prevent unnecessary calot's triangle dissection ( LSC Type II ) in frozen calot's or gallbladder bed dissection ( LSC Type I ) or by doing LSC Type III thereby reducing associated morbidity and mortality.

**Keyword:** Laparoscopic Cholecystectomy, Safe outcome, Conversion, Risk factors, Gallstone

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### I. Introduction

Laparoscopic cholecystectomy (LC) is the current gold standard for treatment of symptomatic gallstone disease.<sup>1</sup> There is a constant endeavor to identify preoperative and intraoperative factors that favor safer outcome during Laparoscopic Cholecystectomy. Traditionally, various preoperative factors like male gender, diagnosis of acute cholecystitis and intraoperative factors like adhesions in calot's triangle and variations in anatomy of calot's triangle have been important factors in determining the intraoperative and postoperative complications.

Despite all the advances in the field of laparoscopic surgery since its introduction, no clear set of preoperative and intraoperative parameters can determine the outcome of the surgery.

This Study aims to evaluate the role of a new objective scoring system (ICHBS scoring system<sup>1</sup>) based on various preoperative factors which include the patient's history, clinical examination findings, biochemical investigations and ultrasound findings and intraoperative first port findings which include gallbladder and hepatic factors to allow grading of the findings and standardize the levels of difficulty levels and applying its recommendations for safe outcome.

## II. Materials and Methods

This prospective study was conducted over a period of 8 months from 1<sup>st</sup> April 2019 to 30th November 2019 in the Department of Surgery of a tertiary care institute.

As per the study protocol, 224 consecutive patients were enrolled for the study. All procedures were performed or supervised by senior faculty members experienced in performance of LC with minimum experience of MAS (Minimal Access Surgery) of 2 years.

The study group comprised of consecutive patients (age  $\geq 10$  years) presenting with symptomatic cholelithiasis admitted in the department through Outpatient department / Emergency / transferred from other specialties.

All patients underwent a thorough preoperative evaluation including detailed history and clinical examination and hematologic and biochemical investigations including hemogram, liver and kidney function test and coagulation profile. The abdominal ultrasound examination was performed by senior radiologists well versed with hepatobiliary anatomy. The parameters recorded included gallbladder wall thickness (mm), stone impacted or not, presence of pericholecystic fluid and features of cirrhotic liver. The diameter of common duct and presence / absence of intrahepatic biliary radical dilatation were also recorded.

Further imaging such as magnetic resonance cholangiopancreatography (MRCP) and contrast enhanced abdominal computed tomography scans were performed in patients with suspected Choledocholithiasis (common duct diameter  $> 6$ mm) and gallbladder malignancy (GBM)(wall thickness  $>5$ mm) respectively.

### Exclusion Criteria:

1. Age below 10 years( paediatric MIS instruments unavailable)
2. Pregnancy
3. Proven Choledocholithiasis or suspected GBM.
4. Not fit for general anaesthesia due to serious medical co morbid illness or bleeding disorders.

All patients who fulfilled the inclusion criteria had their ICHBS score calculated either manually or from the 'GALLBLADDER WALK' Application available on android and iOSoperating system.

Following written informed consent, all patients underwent standard 4 port laparoscopic cholecystectomy with or without extra port insertion/subtotal cholecystectomy/open cholecystectomy based on the recommendations of ICHBS under general anesthesia. The pneumoperitoneum was created using Veress needle with closed method or open method when indicated. Following completion of the procedure, as per the departmental protocol for LC, tube drain was placed in Morrison's pouch in all patients.

All patients received analgesia (Diclofenac sodium intravenous 50 mg at 8 hourly interval for first 24 hours and then tapered to 'on demand' basis) 48 hours after completion of LC.

### Outcome Measures:

**TABLE – 1** ICHBS (Intraoperative Clinical Hepato-BiliaryScore ) predicting intra-operative difficulty level during laparoscopic cholecystectomy <sup>2</sup>

Scoring Factors	Minimum	Maximum	Score
<b>History</b>			
1. Age	$\leq 40$ years (0)	$>40$ years (1)	Minimum=0 Maximum=8
2. Gender	Female (0)	Male (1)	
3. History of hospitalization for acute cholecystitis	No (0)	Yes (4)	
4. Gall stone/Alcoholic pancreatitis within 3 months	No(0)	Yes(1)	
Post ERCP – with CBD stent	No (0)	Yes (2)	
Without CBD stent			
<b>Clinical</b>			
1. Previous Abdominal Scar	No(0)	Infra-Umbilical (1) Supra-Umbilical(2)	Minimum=0 Maximum=3
2. Palpable Gall Bladder	No(0)	Yes(1)	
<b>Bio-Chemical Parameters</b>			
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)	
<b>Sonographyhepato biliary system</b>			
1. Wall Thickness	$\leq 3$ mm(0)	$>3$ mm(1)	Minimum=0 Maximum=5
2. Pericholecystic fluid collection	No(0)	Yes(1)	
3. Impacted Stone	No(0)	Yes(1)	
4. Cirrhotic Liver	No(0)	Yes(2)	
<b>Intraoperative first port finding (laparoscopic view ) without corrective intervention</b>			

Gallbladder factors				
1.	Gall bladder visualised out of liver margin > 3 cm	Yes (0)	No (1)	Minimum=0 Maximum=10
(a)	Adhesions with gall bladder	No(0)	Yes(1)	
(b)	Greater omentum	No(0)	Yes(2)	
(c)	Colon or colon + (a)	No(0)	Yes(3)	
(d)	Duodenum or Duodenum + (b)	No(0)	Yes(4)	
3.	Stomach or Stomach + (c)	Yes (0)	No (2)	Minimum=0 Maximum=10
4.	Calot's Triangle posterior fold visualisation	No (0)	Yes (1)	
5.	Excessive fat over calot's triangle	No (0)	Yes (2)	
	Gangrenous / Distended with empyema / mucocele / contracted fibrosed gall bladder			
Hepatic factors				
(1)	Rouvier's Sulcus presence	Yes(0)	No(1)	Minimum=0 Maximum=10
(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)	
(4)	Anomalous congenital presentation of hepatobiliary tree.	No(0)	Yes(4)	

Recommendations of ICHBS in Management of Gallbladder Diseases requiring Laparoscopic Cholecystectomy<sup>2</sup>

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

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).
- 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).

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. Result

The study group consisted of 224 consecutive patients with the mean age of the study group being 39 years.36 patients of the study group were males while 188 were females with male: female ratio being approximately 1:5.

**TABLE 2: RESULTS AT GLANCE**

S.NO.	Parameter	Number
1	Number of patients	224
2	Mean Age (years)	39
3	Male:Female	36:188(1:5.2)
4	USG Diagnosis reporting	
	• Cholelithiasis	133 (59.37%)
	• Acute cholecystitis with cholelithiasis	28 (12.50%)
	• Chronic Cholecystitis with cholelithiasis	19 (8.48%)
	• Mucocele	26 (11.60%)
	• Empyema Gallbladder	18( 8.03%)
5	Outcome	
	• Conversion to open cholecystectomy	11 (4.9%)
	• Haemorrhage	01 (0.45%)
	• Bile duct injury (Repaired over T Tube)	02 (0.89%)
	• Post operative bile leak (in drain)	01 (0.45%)
	• Post op haemorrhage	01 (0.45%)
	• Mortality	00

**TABLE 3: DIFFICULTY LEVELS AS PER ICHBS SCORE RANGE**

Level 1 (Mild)		Level 2 (Moderate)		Level 3 (Severe)	
Ia (0-5)	Ib (6-10)	IIa (11-20)	IIb (21-30)	III(31-40)	
LC without extra port	LC without extra port	LC with extra port	Laparoscopic subtotal cholecystectomy	Laparoscopic subtotal cholecystectomy with fundus first method	Open Conversion
138	23	21	18	13	11

As per the recommendations of ICHBS scoring system the patients were grouped in various difficulty levels and underwent laparoscopic cholecystectomy/ Subtotal Cholecystectomy/ Open Cholecystectomy based on the recommendations

Out of the 224 patients included in the study, One patient had hemorrhage from cystic artery (0.45%) and Two patients had bile duct injury (0.89%) which was repaired over T-Tube.

Eleven patients (4.91%) were converted to open procedure and there was no mortality.

#### IV. Conclusion

Despite all the advancements in laparoscopic surgery over the period of 2 decades , Intraoperative and Postoperative complications during Laparoscopic Cholecystectomy have remained a reality. This can be attributed to factors like equipment failure, poor surgical technique, and a lack of an Objective criteria that can predict the high risk cases, minimum standard of operative procedure for the difficult cholecystectomies and intraoperative complications.

The ICHBS scoring system aims to address the latter by introducing an objective criteria which can standardize the difficulty levels for Laparoscopic Cholecystectomy and recommend the various surgical options for treatment of gallstone disease based on the difficulty levels which can be implemented universally.

The ICHBS scoring system is an extremely effective and free tool in treatment of symptomatic gallstone disease and its application is recommended in all patients planned for LC. It can prevent unnecessary calot's triangle dissection ( LSC Type II ) in frozen calot's or gallbladder bed dissection ( LSC Type I ) or by doing LSC Type III thereby reducing associated morbidity and mortality.

ICHBS( Intraoperative Clinical Hepatobiliary Score) scoring system is a future promise and tool for communication and exchanging the patient clinical information and probable outcome around the world with an objective score in the field of Gallbladder diseases requiring cholecystectomy in an uniform manner.

#### References

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