Clinical and Imaging Predictors in Defining Difficult Laparoscopic Cholecystectomy - An Observational Study

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INTRODUCTION

- **Problem Statement:**
  Need to predict difficulty in laparoscopic cholecystectomy at AIIMS
  Analyze risk factors and propose a scoring system.
- **Rationale:**
  Focus on preoperative conversion prediction and propose new scoring system.
- **Novelty:**
  Defining difficult laparoscopic cholecystectomy is challenging. [1,2]
  Limited use of CECT for prediction.
- **Expected Outcome:**
  Identify predictors to improve surgical management and patient safety.
  Enhance counseling and surgical efficiency.

AIMS AND OBJECTIVES

AIM To determine clinical and imaging predictors which define difficult laparoscopic cholecystectomy and formation of the scoring system.

OBJECTIVES

a. Primary objective : To evaluate the factors in predicting the difficult laparoscopic cholecystectomy in symptomatic cholelithiasis patients.

b. Secondary objective : To formulate a scoring system that predicts the difficulty of laparoscopic cholecystectomy

METHODOLOGY

Study Design: Prospective observational study conducted at AIIMS-Patna.
Study Duration : September 2019 to November 2021.
Sampling Technique: Convenience sampling.

Inclusion Criteria	Exclusion Criteria
Symptomatic cholelithiasis	GB malignancy
	Choledocholithiasis
	Acalculous cholecystitis
	Unfit for general anesthesia
	Unwilling for study

Data Collection : Pre-designed proforma.

Methods :

- Pre-operative evaluation included USG, LFT, CECT.
- Focused Hepatobiliary Imaging: Done for all patients on the day of surgery.
- Triple phase CT performed for high-risk cases.
- Surgical technique involved a 4-port laparoscopic cholecystectomy.
- Operative findings objectively graded as easy or difficult.
- Weighted points assigned to identified risk factors.
- Risk prediction model developed using logistic regression.

Criteria	Easy LC	Difficult LC
Total Time	< 90 min	≥ 90 min
Time for Calot's Dissection	< 20 min	≥ 20 min
Time for Gallbladder Dissection	< 20 min	≥ 20 min
Spillage	No spillage	Spillage
Conversion	No conversion	Conversion to open

RESULTS

Patient Demographics:
Mean Age: 42.7 years
Average BMI: 25.86

Total Patients	Females	Males
287	174	113

Risk Factor	Odds Ratio (95% CI)	β Coefficient	P-value	Points Assigned
Gender (male)	1.168 (0.101 - 13.92)	0.152	0.003	1
Previous abdominal surgery	2.240 (0.139 - 11.65)	1.217	-	1
AST	2.59 (0.52 - 16.19)	1.671	0.011	2
Mobility in USG	3.123 (0.01 - 3.42)	2.132	0.002	3
GB wall thickness in CECT	1.74 (0.00 - 7.16)	0.775	0.010	1
Inflammation at Porta in CECT	2.24 (0.24 - 13.42)	1.25	0.000	2

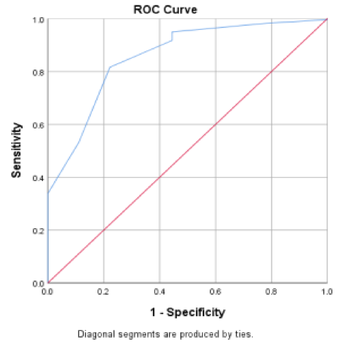


Figure 1: The receiver operator characteristics (ROC) curve for the predictive value of the risk score.

Parameters	Value (95% CI)
Cut off value	5
AUC	0.858 (0.737 - 0.978)
Sensitivity	84.50% (80.13 - 88.24)
Specificity	77.78% (39.99 - 97.19)
Positive Likelihood Ratio (*)	3.80 (1.12 - 12.92)
Negative Likelihood Ratio (*)	0.20 (0.13 - 0.31)
Disease Prevalence (*)	97.34% (95.01 - 98.78)
Positive Predictive Value	99.29% (97.61 - 99.79)
Negative Predictive Value	12.07% (8.19 - 17.44)
Accuracy	84.32% (80.00 - 88.03)

(*): Likelihood ratios and disease prevalence are provided without 95% CI.

Risk Stratification	Easy LC, n (%)	Difficult LC, n (%)	P value
<5	7 (12.1)	51 (87.9)	<.001
≥5	2 (.9)	278 (96.9)	<.001

- Logistic regression identified six significant predictors:
  Gender, previous abdominal surgery, AST levels, mobility in USG, gallbladder wall thickness in CECT, and inflammation at porta in CECT.
- A risk score ranging from 0 to 10 was assigned based on multivariate analysis.
- The rate of difficult LC was highest in the group with a score ≥5 (96.9%).

CONCLUSION

- Developed a straightforward scoring system with six parameters for routine surgical use.
- Intended to identify patients at risk for difficult laparoscopic cholecystectomy preoperatively.
- Aims to prevent inexperienced surgeons from tackling challenging cases.
- Facilitates surgeon selection based on anticipated difficulty, minimizing surgical complications.

References 1) Friedman GD. Natural history of asymptomatic and symptomatic gallstones. Am J Surg. 1993;165:399–404. 2) Tang B, Cuschieri A. Conversions during laparoscopic cholecystectomy: risk factors and effects on patient outcome. J Gastrointest Surg. 2006;10:1081–1091