

# Failure of Laparoscopic Cholecystectomy Preoperative Factors as Predictors

Soundarya Yamakanamardi<sup>1</sup>, Nikhil Naithottu G<sup>2</sup>, T Kempraj<sup>3</sup>

**Author's Affiliation:** <sup>1</sup>Assistant Professor, <sup>2</sup>Postgraduate, <sup>3</sup>Professor, General Surgery, Bowring and Lady Curzon Hospital and Research Institute, Bangalore, Karnataka 560001, India.

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## Abstract

**Introduction:** Laparoscopic cholecystectomy is the gold standard procedure for gall stone disease. Few cases of acute calculous cholecystitis require conversion to open procedure which can increase the morbidity and financial burden to patient. Hence, through this study we are trying to decide regarding the parameters which would help to assess the patient preoperatively and predict the outcome of laparoscopic cholecystectomy.

**Aims and Objectives:** To assess the preoperative parameters to predict conversion of laparoscopic cholecystectomy to open cholecystectomy in patients with acute calculous cholecystitis.

**Materials and Methods:** A prospective study was conducted at a tertiary care hospital. Study was conducted after obtaining ethical committee clearance and informed consent from patients. 100 patients were included in the study.

**Results:** 100 patients of acute calculous cholecystitis were taken for laparoscopic cholecystectomy of which 80 patients successfully completed the procedure and remaining 20 patients had to undergo conversion to open procedure.

**Conclusion:** Male gender, older age, patients with higher pain (VAS) score, raised TLC, raised total

bilirubin, raised serum ALP are associated with failure of laparoscopic cholecystectomy.

**Keywords:** Acute calculous cholecystitis; Cholecystectomy; Laparoscopic cholecystectomy; Failure of laparoscopy; Conversion to open cholecystectomy.

## Introduction

Laparoscopic cholecystectomy is the gold standard for treating symptomatic gall stones.<sup>1</sup> Langenbuch was the first to do laparoscopic cholecystectomy in 1800's.<sup>2</sup> Erich Muhe in 1985 was first to document about laparoscopic cholecystectomy.<sup>3</sup>

About 1-13% of patients undergoing laparoscopic cholecystectomy will be converted to open technique.<sup>4</sup> The common causes for conversion are: obscure biliary anatomy, presence of dense pericholecystic adhesions, intraoperative bleeding, failure of progression and suspicion of choledocholithiasis.<sup>5,6</sup> Conversion from laparoscopic to open is associated with longer postoperative stays and morbidity and mortality.<sup>7</sup> Hence, it is important to find such patients who are prone for failure of laparoscopic cholecystectomy. In our study we are using few parameters as predictors of failure of laparoscopic cholecystectomy.

## Aims and Objectives

To assess the preoperative parameters to predict

**Corresponding Author:** Nikhil Naithottu G, Postgraduate, General Surgery, Bowring and Lady Curzon Hospital and Research Institute, Bangalore, Karnataka 560001, India.

**E-mail:** [nikhilmangalore99@gmail.com](mailto:nikhilmangalore99@gmail.com)

conversion of laparoscopic cholecystectomy to open cholecystectomy in patients with acute calculous cholecystitis.

### Materials and Methods

A prospective study was conducted at a tertiary care hospital. Study was conducted after obtaining ethical committee clearance and informed consent from patients. 100 patients were included in the study.

#### Inclusion Criteria

- Age above 18 years.
- Confirmed cases of Acute calculous cholecystitis on ultrasonography.
- Patients undergoing cholecystectomy within 3 days of onset of symptoms.

#### Exclusion Criteria

- Age <18 years.
- Presence of other hepatobiliary pathologies.
- Pregnancy
- Uncontrolled diabetes and uncontrolled hypertension.
- Patient previously who had undergone major abdominal surgery.

#### Parameters Observed

- Age
- Sex
- Duration of symptoms (in days)
- Pain score (Visual analogue score VAS)
- Total Leucocyte Count (TLC)
- Serum alkaline phosphatase in IU/L (ALP)
- Total bilirubin in mg/dL
- Intra operative severity grading 10,11
  - I. Edematous
  - II. Mucocele
  - III. Gangrenous
  - IV. Empyema

#### Statistical analysis

The data were analysed using SPSS software. Version 21. Data was described using mean and standard deviation. Tests like Chi-square test, unpaired t test were applied to the data obtained. Level of significance is set at 5%.

### Results

100 patients with confirmed cases of acute calculous cholecystitis presenting between 1 to 3

days of onset of symptoms underwent laparoscopic cholecystectomy. Among 100 patients 80 of them underwent successful completion of laparoscopic cholecystectomy and 20 patients had to undergo conversion to open cholecystectomy.

Patients were categorised according to age (Table 1) and distribution was studied among successful versus failed laparoscopic cholecystectomy. On applying Chi-square test it was not significant ( $p = 0.19$ ). However, mean age distribution in successful laparoscopic approach was 45.89 years whereas the mean age for failed group was 58.43 years and was found to be significant ( $P = 0.0312$ ).

There were 30 male and 70 female patients in our study. Among them 22 male and 58 females underwent successful laparoscopic cholecystectomy. Whereas, 8 male and 12 females had to undergo conversion to open cholecystectomy. Statistically the values were not significant with  $p$  value of 0.275.

Further, on observing the age distribution with respect to intraoperative severity grade it was found that higher the age severe was the intraoperative finding grade  $p = 0.032$  (Table 2). And the severity grade was higher in males compared to females and this was found to be significant ( $p = 0.028$ ).

The mean duration of symptoms in patients undergoing surgery was 2.5 days. However, there was no significant difference found in duration of symptoms between patients undergoing successful laparoscopic cholecystectomy and conversion to open cholecystectomy (Table 3).

During the time of presentation patients' pain was assessed using visual analogue scale (VAS score) and was found that mean VAS in patients undergoing successful laparoscopic procedure was 4.61 and in patients undergoing conversion to open procedure was 8.33 and the data was statistically significant ( $p = <0.0001$ ).

Preoperative laboratory parameter - Total leucocyte count, total bilirubin, serum ALP was assessed. All the three parameters were found to be raised in patients with failed laparoscopic cholecystectomy compared to patients undergoing successful laparoscopic cholecystectomy (Table 3). And the data of above three parameters were statistically significant ( $p = <0.0001$ ).

Intraoperative severity grades were found to be significantly associated ( $p = <0.0001$ ) with failure and success of laparoscopic procedure (Table 4). More severe the grading had more chances of conversion to open procedure.

**Table 1:** Age and gender distribution of patients undergoing successful and failed laparoscopic cholecystectomy (Chi-square test).

Age	Laparoscopic Cholecystectomy		Total	P Value
	Successfull	Failed		
25-35 yrs	10	1	11	0.1900
36-45yrs	19	2	21	
>/=46yrs	51	17	68	
Total	80	20	100	
<b>Gender</b>				
Male	22	8	30	0.2752
Female	58	12	70	
Total	80	20	100	

**Table 2:** Age and gender distribution of patients with intraoperative severity in acute cholecystitis (Chi-square test).

Age	Intraoperative Severity				Total	P Value
	I	II	III	IV		
25-35 yrs	9	1	0	1	11	0.032
36-45yrs	10	2	1	8	21	
>/=46yrs	32	21	6	9	68	
Total	51	24	7	18	100	
<b>Gender</b>						
Male	10	9	5	6	30	0.028
Female	41	15	2	12	70	
Total	51	24	7	18	100	

**Table 3:** Comparison of preoperative factors between Successful and failed laparoscopic cholecystectomy (Unpaired t Test).

Duration of Symptoms	n	Min	Max	Mean	SD	P Value
Laparoscopic Cholecystectomy Successful	80	1	3	2.05	0.86	0.420
Failed	20	1	3	2.00	0.89	
TLC	80	4000	12000	7.13	2.04	<0.0001
Laparoscopic Cholecystectomy Successful						
Failed	16	9900	26000	13.52	4.72	
Total bilirubin (mg/dL)	80	0.3	1.1	0.66	0.24	<0.0001
Laparoscopic Cholecystectomy Successful						
Failed	20	0.9	3.2	2.08	0.79	
ALP (IU/L)	80	40	130	69.41	23.01	<0.0001
Laparoscopic Cholecystectomy Successful						
Failed	20	111	260	186.4	48.24	

**Table 4:** Distribution of intraoperative severity grades in patients with successful versus failed laparoscopic cholecystectomy (Chi-square test).

Intraoperative Severity	Laparoscopic Cholecystectomy		Total	P Value
	Successful	Failed		
I.	50	1	51	<0.0001
II.	21	3	24	
III.	1	6	7	
IV.	0	18	18	

## Discussion

Laparoscopic cholecystectomy is gold standard surgical approach for gall stone disease. However, due to various factors intraoperatively the patients may require conversion to open procedure. According to some studies it is shown that the conversion rate is around 1-13%.<sup>4</sup> In our study the chances of conversion were slightly higher i.e., 20%. According to few literature the rate of conversion to laparotomy during laparoscopic cholecystectomy in acute calculous cholecystitis is 2 to 25%.<sup>8,9</sup> Conversion of laparoscopic cholecystectomy has been associated with a longer operative time, the use of more anaesthetic drugs, increased overall morbidity, higher rate of infective complications, longer recovery time, longer hospital stay, higher cost and patient dissatisfaction.<sup>10,11</sup> To avoid these untoward occurrences we conducted a study by using few preoperative parameters. Many studies have shown that the age above 50 years is a significant risk factor for difficult laparoscopic cholecystectomy.<sup>12</sup> In our study the mean age of patients who had conversion to open procedure was 58.43 years (p=0.0312).

Most of the studies have shown that the male gender having significant higher risk of conversion to open during laparoscopic cholecystectomy.<sup>13,14,15</sup> Further the risk of failure of laparoscopic procedure for acute cholecystitis was 1.76 times (odds ratio) higher in males compared to females. Also, the intraoperative severity grade was higher in males.

Duration of symptoms did not show any significant difference with respect to failure of laparoscopic procedure. Pain score using visual analogue scale showed significant association with success or failure of laparoscopy with higher VAS having higher chances of laparoscopy failure.

According to Tokyo guidelines few markers were identified to grade the severity of acute cholecystitis such as duration of symptoms and TLC count<sup>16,17</sup>. In our study association of duration was not found to be significant. Rattner et al<sup>18</sup>, concluded that the degree of leucocytosis to be associated with intraoperative severity and the results of our study is also consistent with it. In our study raised levels of TLC, total bilirubin, serum ALP were significantly associated with failure of laparoscopic cholecystectomy and intraoperative severity.

Intraoperative severity grade 1 had lesser chances of failure of laparoscopic approach and grade 4 had higher chances of failure.

## Conclusion

- Higher the age more chances of laparoscopy failure and more severe is the intraoperative finding.
- Male patients are at 1.76 times higher risk of laparoscopic cholecystectomy failure and higher is the intraoperative severity grade.
- Duration of symptoms between 1 to 3 days was not associated with failure of laparoscopic cholecystectomy.
- Pain (VAS score) was significantly associated with success or failure of laparoscopic cholecystectomy.
- Total leucocyte count, total bilirubin, serum alkaline phosphatase was significantly associated with outcome of procedure and severity of cholecystitis.
- Intraoperative severity grade in acute cholecystitis was significantly associated with success or failure of laparoscopic cholecystectomy.

Male gender, older age, patients with higher pain (VAS) score, raised TLC, raised total bilirubin,

raised serum ALP are associated with failure of laparoscopic cholecystectomy.

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