

**Predictor Factors of Difficult Laparoscopic Cholecystectomy in Cholelithiasis Patients in  
Dr. Mohammad Hoesin General Hospital Palembang**

Hero Akbar<sup>1</sup>, Hafizd Komar<sup>1\*</sup>, Theodorus<sup>1</sup>

<sup>1</sup>Depatemen of Surgery, Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia

Corresponding author: [drhafied@gmail.com](mailto:drhafied@gmail.com)

**Abstract**

**Background:** Laparoscopic cholecystectomy is the gold standard for cholecystectomy and can be performed by trained general surgeons. However, the percentage of complications that occur from cholecystectomy laparotomy is approximately 20 percent. So, it is necessary to research risk factors for complications.

**Methods:** This research is an analytic observational study with a cross-sectional design using preoperative data and intraoperative findings of laparoscopic cholecystectomy. Age, gender, body mass index, history of cholecystitis, number of stones, and location of stones are identified as predictors that affect the difficulty of laparoscopic cholecystectomy. The data collection was performed at the Mohammad Hoesin Hospital Palembang Department from July 2019- July 2020.

**Results:** Of the 67 research samples, a Chi-square test was performed, and the factors that had a significant relationship were the body mass index (P-Value 0,000), history of cholecystitis (P-Value 0,000), number of stones (P-Value 0.049), and stone location. (P-Value 0.002).

**Conclusion:** The backward stepwise logistic regression using the four variables showed that the history of cholecystitis had an independent effect (OR-adjusted 28.889 and P-Value 0.000).

**Keywords:** difficult, predictor, gold standard, Laparoscopy cholecystectomy.

## **1. Introduction**

Gallstone disease (cholelithiasis) is one of the most common diseases of the digestive tract. Limitation cholelithiasis is a disease of gallstones found in the gallbladder. It is estimated that there is a 10-15% incidence of gallstones in the adult population in the United States.<sup>1</sup> Approximately 1,000,000 operations are performed annually for this disease; at least 6,000 deaths occur as a result of complications and management.<sup>2</sup> While in Dr. Mohammad Hoesin Palembang performed a total of 384 laparoscopic cholecystectomy operations in the period January 2016 - December 2018.

Laparoscopic cholecystectomy is the gold standard for cholecystectomy and can be performed by trained general surgeons. However, approximately 20 percent complications occur from cholecystectomy laparotomy. So, it is necessary to research risk factors for complications. With that, it is hoped that the morbidity and mortality rates can be reduced.<sup>3</sup>

Some authors subsequently classified laparoscopic cholecystectomy as easy (operation time <60 minutes, no bile spillage, no injury to the ducts or arteries), and difficult (operation time > 60 minutes, bile/stone spillage, duct injury, and conversion to open cholecystectomy in approximately 2.6% - 5.2% .<sup>4-5</sup>

This study was conducted to identify the various factors associated with difficult laparoscopic cholecystectomy that can assist in predicting or anticipating difficult laparoscopic cholecystectomy in the pre-operative period, enabling the surgeon to prepare in advance for difficulties to be encountered during the procedure, thereby reducing morbidity and mortality from difficult laparoscopic cholecystectomy.

Based on the background described above, the problem formulation in this study is proposed: What factors influence difficult laparoscopic cholecystectomy in cholelithiasis patients at Mohammad Hoesin Hospital Palembang?

## **2. Methods**

This research is an analytic observational study with a cross-sectional design, conducted at the Department of Surgery, Mohammad Hoesin Hospital, Palembang from July 2019-July 2020. The total sample size of 67 patients was collected using a non-random method, namely, consecutive sampling.

The inclusion criteria were patients who had been diagnosed with cholelithiasis and patients with cholelithiasis who underwent laparoscopic cholecystectomy. The exclusion criteria were patients with CBD dilation, CBD stones, increased alkaline phosphatase, and requiring exploration of CBD, patients with obstructive jaundice, patients with suspicion of gallbladder malignancy.

## **3. Results**

The research subjects were 67 people who had met the inclusion and exclusion criteria. The gender of female 52.2% is slightly more than male 47.8%. Patients  $\geq 65$  years old were 16.4%, and patients  $< 65$  years were 56%. Body mass index  $\geq 30$  kg/m<sup>2</sup> was 25.4% and  $< 30$  kg/m<sup>2</sup> was 74.6%. For the history of cholecystitis 37.3% and intraoperative findings, the number of multiple stones was 88.1%, and impacted stones were 7.5%. For more details, see Table 1.



**Table 1.** Characteristics of research subjects (N = 67).

<b>Variable</b>	<b>Total</b>
<b>Age</b>	
≥65 years	11 (16.4 %)
<65 years	56 (83.6 %)
<b>Gender</b>	
Male	32 (47.8 %)
Women	35 (52.2 %)
<b>Body Mass Index</b>	
≥ 30 kg / m <sup>2</sup>	17 (25.4)
<30 kg / m <sup>2</sup>	50 (74.6)
<b>History of cholecystitis</b>	
Yes	25 (37.3 %)
Not	42 (62.7 %)
<b>Number of Stones</b>	
Multiple	59 (88.1 %)
Solitary	8 (11.9 %)
<b>Location of Stone</b>	
Impaction	5 (7.5 %)
Mobile	62 (92.5%)
<b>Laparoscopy</b>	
<b>cholecystectomy</b>	21 (31.3 %)
Difficult	46 (68.7 %)
Easy	

**Table 2.** Results of the analysis of the relationship between risk factors and Laparoscopy cholecystectomy (N = 67)

<b>Risk factors</b>	<b>Difficult Laparoscopy cholecystectomy</b>	<b>Easy Laparoscopy cholecystectomy</b>	<b>P-Value</b>	<b>Prevalence Ratio (CI 95%)</b>	<b>(CI</b>
<b>Age</b>					
≥65 years	4	7	0.730 <sup>a</sup>	1.311	-
<65 years	17	39		(0.338 5.078)	
<b>Gender</b>					
Male	8	24	0.307 <sup>a</sup>	0.564	-
Women	13	22		(0.197 1.618)	
<b>Body Mass Index</b>					
≥ 30 kg / m <sup>2</sup>	17	8	<b>0.000<sup>b</sup></b>	20.188	-
<30 kg / m <sup>2</sup>	4	38		(5.342 76.293)	
<b>History of cholecystitis</b>					
Yes	18	6	<b>0.000<sup>a</sup></b>	40.000	-
Not	3	40		(8.984 178.085)	
<b>Number of Stones</b>					
Multiple	21	38	<b>0.049<sup>b</sup></b>	4.421	
Solitary	0	8			
<b>location of Stone</b>					
Impaction	5	0	<b>0.002<sup>a</sup></b>	14.375	
Mobile	16	46			

**Table 3.** Results Analysis of predictor variables and laparoscopy cholecystectomy

Predictor Variable	OR	<i>P-Value</i>	OR	<i>P-Value</i>
	Unadjusted		Adjusted	
BMI $\geq$ 30 kg / M <sup>2</sup>	20.188	0.000	2.142	0.441
History of cholecystitis	40.000	0.000	28.889	0.000
Location of Stones	14.375	0.002	14.375	0.999
Number of Stones	4.421	0.049	4.421	0.999

Backward stepwise logistic regression analysis was performed on variables that had significance in the bivariate analysis (Table 3). The analysis was performed with SPSS 22.0 for windows. Variables History of cholecystitis has a P-value of 0.000 with (95% CI) 8.984 - 178.085. giving an independent effect of (Adjusted Risk) 28.889 on difficult laparoscopic cholecystectomy.

#### 4. Discussion

In this study, men (47.8%) were slightly less than women (52.2%). In the *Chi-Square test*, the P-value was 0.307, and the prevalence ratio was 0.564. Gender factors do not have a significant effect on difficult cholecystectomy laparoscopy.

There is an influence of gender on the process of gallbladder formation - more frequent inflammation and fibrosis - thus causing difficulties with laparoscopic cholecystectomy.<sup>28</sup>

Patient age was stratified by  $\geq$ 65 years and <65 years. In this study, the age group  $\geq$ 65 years (16.4%) and <65 years was 83%. In the Chi-square test, the P-value was 0.730, with a prevalence ratio of 1.311. in this study, the age factor had no effect on difficult laparoscopic cholecystectomy.

The patient's body mass index was categorized as obese ( $\geq$ 30 kg/m<sup>2</sup>) and non-obese (<30 kg/m<sup>2</sup>). There were 25.4% obese patients and 74.6% non-obese patients. In the Chi-Square test, the P-value was 0.000, and the prevalence ratio was 20.188. In this study, the Body Mass Index factor had a significant effect on Difficult Laparoscopic Cholecystectomy. Obesity is associated

with a high incidence of complications in the biliary tract. This is caused by an abnormal distribution of fat, enlarged liver, and difficulty access and exposure. There is a morbidity triad, namely obesity, acute cholecystitis, and long operating time.<sup>6</sup>

History of cholecystitis was 37.3%, and 62.7% were not. In the *Chi-Square* Test, the P-value is 0.000, with a Prevalence Ratio of 40.000. In this study, the factors of history of cholecystitis had a significant effect on difficult laparoscopic cholecystectomy. History of cholecystitis has a significant association with the difficulty of laparoscopic cholecystectomy when performing gallbladder dissection of the liver parenchyma. In patients with a history of cholecystitis, it is difficult to distinguish the anatomical structures that make the laparoscopy time lengthened. NICE guidelines for managing cholecystitis, it is recommended that laparoscopic cholecystectomy be performed after one week from diagnosis to avoid the difficulty of the operation.<sup>8</sup>

The location of impaction stones in the gallbladder was 7.5%, and the mobile was 92.5%. In the *Chi-Square* test, the P-value was 0.002, with a prevalence ratio of 14.375. In this study, the stone location factor had a significant effect on difficult laparoscopic cholecystectomy. Stones that are impacted on the Hartmann pouch or gallbladder neck stimulate inflammation resulting in adhesions in the surrounding area and Calot's triangle.<sup>9</sup> Research by Hu *et al.* states that there is an association of impacted stones on the neck of the gallbladder with the conversion of open cholecystectomy. In this study, the number of multiple stones was 88.1% and 11.9% solitary. In the *Chi-Square* test, the P-value was 0.049, with a Prevalence Ratio of 4.421. In this study, the number of stones factor had a significant effect on difficult laparoscopic cholecystectomy. Multiple stones in the gallbladder can cause difficulties in adhesion, calot's triangle dissection, and gallbladder extraction.<sup>10</sup>

Laparoscopic cholecystectomy was classified as difficult as many as 31.3% and as many as 68.7%. For those who converted to open cholecystectomy, there were 4 cases. This was due to injuries from CBD and difficulty in access and exposure. For difficult Laparoscopic cholecystectomy cases, Ismail Cem Sormaz *et al.* explained that special techniques could be used, such as the Fundus-first technique and partial cholecystectomy.

## 5. Conclusion

In this study, it was found that there were slightly more women than men who suffered from cholelithiasis (age <65 years as much as 83.6%). There is a correlation between body mass index, cholecystitis history, number of stones, and location of stones to difficult laparoscopic cholecystectomy. Variables History of cholecystitis was a factor that independently influenced adjusted risk (28.889) to difficult laparoscopic cholecystectomy. It is necessary to do further research which involves more samples and more detailed and applicable variables so that the prediction of the laparoscopic cholecystectomy category can be used as a standard in Teaching Hospital.

## 6. References

1. Bruce D. Schirmer, Kathryn L. Winters RE. “*Cholelithiasis and Cholecystitis*”. J Long Term Eff Med Implants. 2005;15:329–38.
2. Abelson JS, Spiegel JD, Afaneh C, Mao J. “*Evaluating cumulative and annual surgeon volume in laparoscopic cholecystectomy*”. Surgery 2014;i:1–7.
3. Singh K, Ohri A. Article Original Difficult laparoscopic cholecystectomy : A large series from north India. 2006;68.
4. M. Balal, G. David, S. Willmott, D.J. Corless, M. Daekin, and J.P. Slavin, “*Conversion after laparoscopic cholecystectomy in England*,” Surgical Endoscopy, vol. 23, no. 10, pp. 2338-2344, 2009
5. V.H.Le, D.E. Smith, and B.L Johnson, “*Coverision of laparoscopic to open cholecystectomy in the current era of laparoscopic surgery*,” The American Surgeon, vol. 78, no. 12, pp. 1392-1395, 2012
6. Nuzzo G, Giuliante F, Persiani R. “*The risk of biliary ductal injury during laparoscopic cholecystectomy*”. J Chir (Paris). 2004; 141: 343-353
7. Simopoulus C, Botaitis S, Karayiannakis AJ, et al. “*The contribution of acute cholecystitis, obesity, and previous abdominal surgery on the outcome of laparoscopic cholecystectomy*”. Am Surg. 2007; 73:371-376.





**SJS**

**SRIWIJAYA JOURNAL OF SURGERY**

8. National Institute for Health and Care Excellence (2014) "*Gallstone disease*". Diagnosis and Management . NICE, London
9. Hu ASY, Menon R, Gunnasson R, de Costa A. "*Risk factors for conversion of laparoscopic cholecystectomy to open surgery*" – A systematic literature review of 30 studies. Am J Surg 2017; 214; 920-30
10. Vivek MAKM, Augustine AJ, Rao R. A "*comprehensive predictive scoring method for difficult laparoscopic cholecystectomy*". J Min Acc Surg. 2014; 10(2): 62-7.