

## Original Research

### ALTERATIONS IN SERUM BILIRUBIN LEVELS PRE AND POST LAPAROSCOPIC CHOLECYSTECTOMY

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#### ABSTRACT:

**Aim-** The aim of this study was to assess changes in serum bilirubin levels before and after laparoscopic cholecystectomy (LC). **Materials and methods-** A total of 50 patients were included, and comprehensive demographic data were gathered for each. Blood samples were collected at baseline (preoperatively) and at 24 and 72 hours postoperatively to evaluate serum bilirubin levels. The changes in bilirubin were analyzed using SPSS software. **Results-** The mean total serum bilirubin levels were recorded at 0.45 mg/dL during the preoperative period, increasing to 1.12 mg/dL at 24 hours post-operation and decreasing to 0.47 mg/dL at 72 hours post-operation. Statistical analysis indicated significant differences among these values. Similarly, the mean serum direct bilirubin levels were found to be 0.36 mg/dL preoperatively, 0.63 mg/dL at 24 hours post-operation, and 0.38 mg/dL at 72 hours post-operation, with the comparisons also yielding statistically significant results. **Conclusion-** Significant alterations in serum bilirubin levels are observed in patients undergoing laparoscopic cholecystectomy.

**Keywords-** laparoscopic, cholecystectomy, bilirubin

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#### INTRODUCTION

Since the advent of laparoscopic cholecystectomy in 1987, there has been a significant increase in understanding the challenges associated with this surgical procedure, as well as an enhanced awareness of its potential complications. The advancement of technical skills aimed at addressing these challenges, along with the early identification and prompt management of complications, are essential for the successful execution of the procedure.<sup>1,2</sup> While open cholecystectomy has largely been supplanted by the laparoscopic approach, the risk of iatrogenic duct injuries remains elevated in the latter. The incidence and nature of biliary injuries occurring during laparoscopic cholecystectomy can vary, making timely diagnosis and intervention crucial for patient safety.<sup>3</sup> The emergence of laparoscopic surgery has fundamentally transformed the management strategies for patients suffering from gallbladder disease and common bile duct stones, establishing laparoscopic cholecystectomy (LC) as the "gold standard" for treating benign gallbladder conditions such as gallstones and cholecystitis.<sup>4,5</sup> Among the

various methods for assessing biliary injuries, biochemical analysis of liver enzymes is a prevalent clinical practice. The sensitivity of liver function tests (LFTs) in identifying bile flow obstructions has been reported to exceed 90%. Any elevation in these enzyme levels raises concern for clinicians and necessitates further investigation to ascertain the underlying cause.<sup>6,7</sup> Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) are typically regarded as indicators of hepatocellular function, while alkaline phosphatase (ALP) levels tend to rise in cases of biliary duct obstruction. Additionally, bilirubin levels may increase due to hemolysis or bile flow obstruction, and markedly elevated serum transaminases can indicate the presence of common bile duct (CBD) stones. Consequently, this study aims to assess changes in serum bilirubin levels before and after laparoscopic cholecystectomy (LC).

#### Materials and methods

A total of 50 patients were included, and comprehensive demographic data were gathered for

each. Blood samples were collected at baseline (preoperatively) and at 24 and 72 hours postoperatively to evaluate serum bilirubin levels. The changes in bilirubin were analyzed using SPSS software, with the goal of determining any significant fluctuations post-surgery. The findings could offer insights into the biochemical impact of LC and its implications for postoperative recovery.

## Results

**Table 1: Age Group Distribution of Subjects**

Age group (years)	Frequency	Percent
Less than 45	18	36
More than 45	32	64
Total	50	100

Table 1 presents the age group distribution of subjects involved in the study. Among the total of 50 participants, 18 (36 percent) were classified as being less than 45 years old. In comparison, 32 individuals (64 percent) fell into the category of more than 45 years old. This distribution indicates a larger proportion of older individuals in the study population, highlighting a trend towards an increased representation of participants over the age of 45.

**Table 2: Changes in Serum Bilirubin Levels**

Bilirubin Levels (mg/dL)	Mean	SD	p-value
Pre-operative Total Bilirubin	0.45	0.23	0.003*
Post-operative Total Bilirubin (24 hours)	1.12	0.46	
Post-operative Total Bilirubin (72 hours)	0.47	0.05	
Pre-operative Direct Bilirubin	0.36	0.07	0.019*
Post-operative Direct Bilirubin (24 hours)	0.63	0.27	
Post-operative Direct Bilirubin (72 hours)	0.38	0.03	

\*: Significant

Table 2 illustrates the changes in serum bilirubin levels measured in mg/dL throughout the study. The mean total serum bilirubin levels were recorded at 0.45 mg/dL during the preoperative period, increasing to 1.12 mg/dL at 24 hours post-operation and decreasing to 0.47 mg/dL at 72 hours post-operation. Statistical analysis indicated significant differences among these values. Similarly, the mean serum direct bilirubin levels were found to be 0.36 mg/dL preoperatively, 0.63 mg/dL at 24 hours post-operation, and 0.38 mg/dL at 72 hours post-

operation, with the comparisons also yielding statistically significant results.

## Discussion

Laparoscopic cholecystectomy (LC) is a commonly performed minimally invasive surgical procedure for the removal of the gallbladder, particularly in patients with gallstones or other gallbladder-related issues.<sup>8</sup> One of the key biochemical parameters that can be affected by this surgery is serum bilirubin, a substance produced by the breakdown of red blood cells and processed by the liver. Monitoring serum bilirubin levels provides valuable insights into liver function and bile metabolism during and after surgical interventions. Preoperative and postoperative fluctuations in bilirubin levels can help assess liver performance, identify potential complications, and monitor recovery. The significance of tracking these changes lies in understanding the body's response to surgical stress, especially in patients who might already have compromised liver function.<sup>9</sup>

In our study the mean total serum bilirubin levels were recorded at 0.45 mg/dL during the preoperative period, increasing to 1.12 mg/dL at 24 hours post-operation and decreasing to 0.47 mg/dL at 72 hours post-operation. Statistical analysis indicated significant differences among these values. Similarly, the mean serum direct bilirubin levels were found to be 0.36 mg/dL preoperatively, 0.63 mg/dL at 24 hours post-operation, and 0.38 mg/dL at 72 hours post-operation, with the comparisons also yielding statistically significant results. Our findings align with those of Kumar, D. (2020)<sup>10</sup>, who reported mean total serum bilirubin levels at three different time points: preoperative, 24 hours postoperative, and 72 hours postoperative. The mean levels observed were 0.80 mg/dL preoperatively, 1.62 mg/dL at 24 hours post-operation, and 0.78 mg/dL at 72 hours post-operation. Nagae M et al compared the associations of postoperative D-Bil and I-Bil with outcomes. They included adult patients requiring postoperative intensive care for more than 48 hours between 2008 and 2013, except those undergoing liver operations. The number of patients was determined using a power calculation. D-Bil and I-Bil measurements were obtained on postoperative days (POD) 1 and 2. The primary outcome was defined as hospital mortality, with the number of ICU-free survival days (IFSD) at POD 28 as the secondary outcome. The study population consisted of 1,903 patients with a mortality rate of 2.2%. D-Bil at POD 1 was significantly higher in non-survivors than survivors ( $P = 0.001$ ), but I-Bil at POD 1 showed no such relation ( $P = 0.209$ ). Multivariate logistic analysis indicated that higher postoperative D-Bil was independently associated with increased postoperative mortality (POD 1: adjusted odds ratio [OR] = 2.32,  $P < 0.001$ ; POD 2: adjusted OR = 1.95,  $P < 0.001$ ), but I-Bil showed no such relation (POD 1:  $P = 0.913$ ; POD 2:  $P = 0.209$ ). Increased D-Bil was

independently associated with decreased IFSD at POD 28 (POD 1: adjusted coefficient =  $-1.54$ ,  $P < 0.001$ ; POD 2:  $-1.84$ ,  $P < 0.001$ ). In contrast, increased I-Bil at POD 1 was independently associated with increased IFSD at POD 28 (POD 1: adjusted coefficient =  $+0.39$ ,  $P = 0.021$ ; POD 2:  $+0.33$ ,  $P = 0.080$ ).<sup>11</sup>

### Conclusion

Significant alterations in serum bilirubin levels are observed in patients undergoing laparoscopic cholecystectomy.

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