

ORIGINAL RESEARCH

Evaluation of serum bilirubin levels pre and post laparoscopic cholecystectomy

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ABSTRACT

Background: The current investigation was undertaken to evaluate changes in serum bilirubin concentrations before and after undergoing Laparoscopic cholecystectomy (LC). **Materials & methods:** A cohort of 100 patients who were scheduled to undergo laparoscopic cholecystectomy (LC) were included in the study. Comprehensive demographic information of all the patients was acquired. Blood samples were collected and the levels of serum bilirubin were evaluated prior to the surgical procedure at the initial stage. The serum bilirubin profile was reassessed at 24 and 72 hours postoperatively. A comparison was conducted about the changes observed in the levels of serum bilirubin. The data were recorded and analyzed using the SPSS software. **Results:** Statistically significant differences were observed when comparing the mean total serum bilirubin levels during the preoperative period, postoperative 24 hours, and postoperative 72 hours, which were measured at 0.76 mg/dL, 1.21 mg/dL, and 0.79 mg/dL, respectively. Statistically significant differences were seen in the mean serum direct bilirubin levels during the preoperative period, postoperative 24 hours, and postoperative 72 hours. Specifically, the mean serum direct bilirubin levels were measured at 0.35 mg/dL, 0.69 mg/dL, and 0.39 mg/dL, respectively. **Conclusion:** There is a notable variation in serum bilirubin levels observed in individuals who have Laparoscopic cholecystectomy.

Keywords: Laparoscopic cholecystectomy, Bilirubin

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INTRODUCTION

Laparoscopic cholecystectomy is a minimally invasive surgical procedure for removal of a diseased gallbladder. This technique essentially has replaced the open technique for routine cholecystectomies since the early 1990s.¹ At this time, laparoscopic cholecystectomy is indicated for the treatment of cholecystitis (acute/chronic), symptomatic cholelithiasis, biliary dyskinesia, acalculous cholecystitis, gallstone pancreatitis, and gallbladder masses/polyps.² These indications are the same for an open cholecystectomy. Cases of gallbladder cancers are usually best treated with open cholecystectomy. Approximately 20 million people in the United States have gallstones. Of these people, there are approximately 300,000 cholecystectomies performed annually. Ten percent to 15% of the population has asymptomatic gallstones. Of these, 20% are symptomatic (biliary colic). Of the 20% who are symptomatic approximately 1% to 4% will manifest complications (acute cholecystitis, gallstone pancreatitis, choledocholithiasis, gallstone ileus).³ The

incidence of gallstones increases with an increase in age, with females more likely to form gallstones than males. Age 50 to 65 approximately 20% of women and 5% of men have gallstones. Overall, 75% of gallstones are composed of cholesterol, and the other 25% are pigmented.⁴ Hence, this study was conducted to evaluate changes in serum bilirubin concentrations before and after undergoing Laparoscopic cholecystectomy (LC).

MATERIALS & METHODS

The current study was undertaken to evaluate changes in serum bilirubin levels before and after the performance of Laparoscopic cholecystectomy (LC). A cohort of 100 patients who were scheduled to undergo laparoscopic cholecystectomy (LC) were included in the study. Comprehensive demographic information of all the subjects was acquired. Blood samples were collected and the levels of serum bilirubin were evaluated before to the surgery as a baseline measurement. The serum bilirubin profile was reassessed at 24 and 72 hours postoperatively. A

comparison was conducted about the changes observed in the levels of serum bilirubin. The data obtained from the study was recorded and subsequently analyzed using the Statistical Package for the Social Sciences (SPSS) software.

RESULTS

In this study, a sample size of 100 participants was assessed. Among them, 25 participants were below the age of 40, while the other 75 participants were above the age of 40. Among the sample of 100 participants, 35 were identified as male, while the remaining 65 were identified as female. Statistically

significant differences were observed when comparing the mean total serum bilirubin levels during the preoperative period, postoperative 24 hours, and postoperative 72 hours, which were measured at 0.76 mg/dL, 1.21 mg/dL, and 0.79 mg/dL, respectively. Statistically significant differences were seen in the mean serum direct bilirubin levels during the preoperative period, postoperative 24 hours, and postoperative 72 hours. Specifically, the mean serum direct bilirubin levels were measured at 0.35 mg/dL, 0.69 mg/dL, and 0.39 mg/dL, respectively.

Table 1: Distribution of subjects according to age group

Age group (years)	Frequency	Percent
Less than 40	25	25
More than 40	75	75
Total	100	100

Table 2: Alterations in serum bilirubin levels

Bilirubin levels (mg/dL)	Mean	SD	p- value
Pre- op Total Bilirubin	0.76	0.05	0.002*
Post- op at 24 hr Total Bilirubin	1.21	0.43	
Post-op at 72 hr Total Bilirubin	0.79	0.10	
Pre-op Direct Bilirubin	0.35	0.08	0.0001*
Post-op at 24 hr Direct Bilirubin	0.69	0.25	
Post-op at 72 hr Direct Bilirubin	0.39	0.11	

*: Significant

DISCUSSION

Laparoscopic cholecystectomy (LC) is the gold standard treatment for managing symptomatic cholelithiasis. Its advantages include reduced patient discomfort, better cosmetic results, shorter hospital stay and shorter interval to return to work.^{5,6} However, LC can impair liver function tests (LFTs). Elevation in LFTs following LC is an apparent cause of apprehension to the surgeon concerned about the integrity of the biliary tree.⁷⁻⁹

The liver function tests provide quantitative assessment of liver function but cannot differentiate between causes of liver diseases. However, liver function tests are used to determine the presence of liver disease, diagnosis of liver diseases and monitoring of liver diseases. Several tests are used to detect the derangement of liver functions. The commonly used tests are Serum Bilirubin (S Bil), Alanine Aminotransferase (ALT), Aspartate Aminotransferase (AST), Alkaline Phosphatase (ALP). These enzymes normally concentrated in liver are also present in low concentration in plasma.¹⁰ Hence, this study was conducted to evaluate changes in serum bilirubin concentrations before and after undergoing Laparoscopic cholecystectomy (LC). In this study, a sample size of 100 participants was assessed. Among them, 25 participants were below the age of 40, while the other 75 participants were above the age of 40. Among the sample of 100 participants, 35 were identified as male, while the

remaining 65 were identified as female. Statistically significant differences were observed when comparing the mean total serum bilirubin levels during the preoperative period, postoperative 24 hours, and postoperative 72 hours, which were measured at 0.76 mg/dL, 1.21 mg/dL, and 0.79 mg/dL, respectively. Statistically significant differences were seen in the mean serum direct bilirubin levels during the preoperative period, postoperative 24 hours, and postoperative 72 hours. Specifically, the mean serum direct bilirubin levels were measured at 0.35 mg/dL, 0.69 mg/dL, and 0.39 mg/dL, respectively. Maleknia SA et al¹¹ investigated the changes in liver enzymes and bilirubin levels after laparoscopic cholecystectomy in patients diagnosed with chronic cholecystitis. This cross-sectional study was conducted at Poursina Hospital (Rasht, Iran) and 128 patients who met both inclusion and exclusion criteria were enrolled for further investigations. After collecting the patients' bio-demographic information, levels of serum alkaline phosphatase, lactate dehydrogenase, alanine aminotransferase, aspartate aminotransferase, and bilirubin were checked before laparoscopic cholecystectomy and 24 (post-op 1) and 48 (post-op 2) h after laparoscopic cholecystectomy. No significant difference was found in the serum levels of ALP in post-op 1 and 2 compared both to each other and to the baseline ($P > 0.05$). Regarding AST and ALT, there was a significant increase in post-op 1 and 2 compared to their baseline values

($P < 0.05$). However, the difference between post-op 1 and post-op 2 was not significant for these outcomes. Compared to baseline levels, LDH had a significant increase after post-op 2 ($P = 0.001$); but not after post-op 1 ($P > 0.05$). Moreover, total bilirubin levels showed significant increases at post-op 1 and post-op 2 from the baseline and also in comparison with each other ($P < 0.05$). Their results demonstrated a transient increase in liver function tests and bilirubin after laparoscopic cholecystectomy.

Singal R et al¹² compared and correlated the serum level of bilirubin, alanine transaminase (ALT), aspartate transaminase (AST), alkaline phosphatase (ALP) in patients who underwent LC to those who underwent OC. This study was conducted in the Department of Surgery at MMMSR, MM University, Mullana, Ambala. A total number of 200 patients diagnosed as cholelithiasis were included in the study from May 2012 to May 2014. These cases were randomly divided into two groups (A and B) consisting of 100 cases each. LC was performed in group A patients and OC was done in group B patients. Three blood samples were taken: (I) pre-operatively; (II) after 24 hours of surgery; and (III) after 72 hours of surgery for comparison of the enzyme level alterations. In LC patients, there were rise in the levels of serum bilirubin, AST and ALT after 24 hrs of surgery from the preoperative value and then again fall was noted (near to normal value) after 72 hrs of surgery except in that of ALP. ALP levels showed slight fall after 24 hrs of surgery and then slight rise after 72 hrs which was within the normal limit. Whereas in OC patients, there were slight variations in the liver enzymes (which were within the normal range). Transient elevation of serum bilirubin, AST and ALT occurred after LC or after OC. The alteration in the liver enzymes can be attributed to CO₂ pneumoperitoneum, surgical manipulations, diathermy, patient position, and arterial injury may also other factors. These changes return to normal in 3-4 days after procedure and they have no clinical consequences in patients with normal hepatic function but they may still cause worry to the surgeon regarding the integrity of biliary tree.

CONCLUSION

There is a notable variation in serum bilirubin levels observed in individuals who have Laparoscopic cholecystectomy.

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