ORIGINAL RESEARCH ARTICLE

# Estimation of Alterations Occurring in the Bilirubin Profile of Patients Undergoing Cholecystectomy: A Comparative Study

**Surendra Mehrotra[1], Pradeep Kumar Srivastava[2]**

[1]Associate Professor, [2]Assistant Professor, Department of General Surgery, Mayo Institute of Medical Sciences, Barabanki, Uttar Pradesh, India.

**Corresponding author:** Pradeep Kumar Srivastava, Assistant Professor, General Surgery, Mayo Institute of Medical Sciences, Barabanki, Uttar Pradesh, India

**How to cite this article:** Surendra Mehrotra, Pradeep Kumar Srivastava. Estimation of alterations occurring in the bilirubin profile of patients undergoing cholecystectomy: a comparative study. International Journal of Contemporary Medicine Surgery and Radiology. 2018;3(1):82-84.

**ABSTRACT**

**Introduction:** Cholecystectomy is the most common intraabdominal surgical procedure performed. Laparoscopic removal is now the procedure of choice when cholecystectomy is indicated. Cholecystectomy is known to cause alterations in the hepatic profile of the patients. Hence; we planned the present study to assess the serum bilirubin profile in patients undergoing cholecystectomy.

**Material and methods:** In the present study, we assessed serum Bilirubin levels in patients undergoing laparoscopic cholecystectomy. A total of 50 patients were included in the present study. Routine investigation tests were performed along with estimation of direct and indirect bilirubin. After that all patients got their pre-anaesthetic check-up and underwent laparoscopic cholecystectomy. Estimation of both direct and indirect bilirubin was done again after 72 hours of surgery to monitor the changes occurring in the liver function. All the results were analyzed by SPSS software.

**Results:** Mean total and direct bilirubin levels in patients preoperatively were found to be 0.7845 and 0.2234 respectively. We didn't observe any significant difference while comparing the mean bilirubin values postoperatively after 72 hours in patients undergoing laparoscopic cholecystectomy.

**Conclusion:** No alterations occur in terms of mean bilirubin levels in patients undergoing cholecystectomy.

**Key words:** Bilirubin, Cholecystectomy

## INTRODUCTION

Cholecystectomy is the most common intraabdominal surgical procedure performed.[1,2] Laparoscopic removal is now the procedure of choice when cholecystectomy is indicated.Though, novel, less invasive approaches, such as natural orifice transluminal endoscopic surgery and single incision laparoscopic cholecystectomy, are at present being considered as substitute to the traditional 4-port laparoscopic removal.[3,4] Familiarity of relevant anatomy is imperative for the safe carrying out of any operative procedure.Particularly, in relation to cholecystectomy, it has been documented that misunderstanding of normal anatomy as well as the occurrence of anatomical variations lead to occurrence of major postoperative complications particularly biliary injuries.[5-7]

Cholecystectomy is known to cause alterations in the hepatic profile of the patients.[4,5] Hence; we planned the present study to assess the serum bilirubin profile in patients undergoing cholecystectomy.

## MATERIAL AND METHODS

We planned the present study in the department of general surgery and associated hospital of the medical institute and included assessment of serum Bilirubin levels in patients undergoing laparoscopic cholecystectomy. A total of 50 patients were included in the present study. Ethical permission was taken from the institutional ethical committee and written consent from all the patients after explaining in detail the entire research protocol was obtained.

Inclusion criteria for the present study included:

- Patients undergoing laparoscopic cholecystectomy
- Patients above 18 years of age
- Have symptomatic gallstones

Exclusion Criteria for the present study included:

- Any patient with pre-operative abnormality in liver enzymes
- Patients with Suspected chronic liver diseases
- Patients on hepatotoxic drugs

Detailed clinical history of all the patients was obtained. Routine investigation tests were performed along with estimation of direct and indirect bilirubin. After that all patients got their pre-anaesthetic check-up and underwent laparoscopic cholecystectomy under constant intraperitoneal pressure (12mm Hg) subsequently. Estimation of both direct and indirect bilirubin was done again after 72 hours of surgery to monitor the changes occurring in the liver function.

## STATISTICAL ANALYSIS

All the results were analyzed by SPSS software. Chi- square test was used for assessment of level of significance. P- Value of less than 0.05 was taken as significant.

| Age group (years) | No. of patients | Percentage |
|---|---|---|
| Less than 30 | 2 | 4 |
| 31- 40 | 5 | 10 |
| 41- 50 | 17 | 34 |
| 51- 60 | 20 | 40 |
| 61 and above | 6 | 12 |
| Total | 50 | 100 |

**Table-1:** Demographic details of the patients undergoing cholecystectomy

| Parameter | Mean | SD |
|---|---|---|
| **Total Bilirubin** | .7845 | .0747 |
| Direct Bilirubin | .2234 | .0441 |

**Table-2:** Mean and SD of bilirubin values pre-operatively

| Parameter | Mean | SD |
|---|---|---|
| **Total Bilirubin** | .7781 | .0254 |
| Direct Bilirubin | .2534 | .0114 |

**Table-3:** Mean and SD of bilirubin values after 72 hours post-operatively

| Comparison | Chi- square value | P- value |
|---|---|---|
| Pre-operative VS Post- operative at 72 hr. | 4.88 | 0.41 |

**Table 4:** Comparison of mean Total Bilirubin values at various time intervals

| Comparison | Chi- square value | P- value |
|---|---|---|
| Pre-operative VS Post- operative 72 hr. | 5.81 | 0.12 |

**Table-5:** Comparison of mean Direct Bilirubin values at various time intervals

## RESULTS

A total of 50 patients were included in the present study. Out of 50, most of the patients belonged to the age group of 41- 60 years. Mean total and direct bilirubin levels in patients preoperatively were found to be 0.7845 and 0.2234 respectively. We didn't observe any significant difference while comparing the mean bilirubin values postoperatively after 72 hours in patients undergoing laparoscopic cholecystectomy.

## DISCUSSION

In the present study, we didn't observe any significant alterations in the mean serum bilirubin postoperative values in patients undergoing cholecystectomy. Tauro LF et al investigated the effect of laparoscopic surgery on liver function and the possible mechanisms behind such effect. Blood samples were collected from 60 patients undergoing various types of laparoscopic procedures, preoperatively once and post operatively on day 1 and day 7. They were tested for liver function by comparing the levels of serum bilirubin, serum alanine amino transferase (ALT), serum aspartate aminotransferase (AST) and serum alkaline phosphatase. The time of $CO_2$ insufflation was also measured. The levels of serum AST, ALT, bilirubin and alkaline phosphatase increased significantly during the first 48 hrs post operatively. Doubling of pre-op values of AST was seen in 33.3% and of ALT was seen in 31.7%. By 7th post operative day, the levels of AST, ALT, bilirubin and alkaline phosphatase returned to near pre-operative values. $CO_2$ pneumoperitonium was found to be a major cause of increased liver enzymes and serum bilirubin in the study. Transient elevation of hepatic enzymes occurs after laparoscopic surgery and $CO_2$ pneumoperitoneum seemed to be the major reason.[9] Koirala R et al investigated the effect of laparoscopic surgery on liver function and the probable mechanisms leading to such effect. Blood samples were analysed for liver function by determining the level of serum alanine aminotrasferase (ALT) and aspartate aminotrasferase (AST) before and after surgery from 30 patients who underwent laparoscopic cholecystectomy (LC) and 20 patients who underwent open cholecystectomy (OC). The serum level of ALT and AST increased significantly during the first 24 hours after surgery in laparoscopic cholecystectomy. Though no significant change of the serum liver enzymes was found in open cholecystectomy patients. Consequently, there was statistically significant difference in change of both ALT and AST levels between LC and OC patients and by the 7th day post operation, the effect reverted back to normal. Therefore, transient elevation of hepatic transaminases occurred after laparoscopic surgery. The major attributing factor appeared to be the pneumoperitoneum $CO_2$. The transient elevation of serum liver enzymes showed no apparent clinical implications in most of the laparoscopic surgery patients,.[10] Al-Luwaizia KR et al conducted study to assess the effect of pneumoperitoneum in LC on liver enzymes and serum bilirubin in contrast with open cholecystectomy. A prospective case control study involved 74 patients treated by LC, and, 30 patients treated by OC as a control group. Blood samples were taken 24 hours pre and post operatively for biochemical tests. There were significant increases in serum bilirubin, Aspartate aminotransferase (AST), alanine aminotransferase (ALT), and Lactate dehydrogenase (LDH) levels in LC group postoperatively when compared with the OC group, while there were no significant changes in serum alkaline phosphatase (ALP). The study concluded that, elevation of serum bilirubin and liver enzymes could be ascribed to the negative effects of the pneumoperitoneum on the hepatic blood flow.[11]

Tan M, et al investigated the effect of laparoscopic surgery on liver function among 286 patients who underwent laparoscopic cholecystectomy (LC) and 40 patients who underwent open cholecystectomy (OC). The liver function test was conducted before and after the operations by measuring the level of serum alanine aminotrasferase (ALT) and aspartate aminotrasferase (AST). The similar tests were also carried out among laparoscopic colorectal cancer resection (LCR) patients and open colorectal cancer resection (OCR) patients to find out whether $CO_2$ pneumoperitoneum could alter the serum liver enzymes. A significant increase in the level of serum ALT and AST was found post operatively during the first 48 h whereas no

significant change of the serum liver enzymes was detected in both group of patients. By the 7th day post operation, the level of both enzymes returned to normal values in LC, OC and OCR patients except LCR patients whose enzymes remained at a higher level. Transient elevation of hepatic transaminases occurred after laparoscopic surgery indicating $CO_2$ pneumoperitoneum as a major causative factor.[12] In a study conducted by Sefik et al among one hundred patients who underwent Laparoscopic Cholecystectomy [LC] (n = 50) or Open Cholecystectomy [OC] (n = 50), liver function tests (total bilirubin; gamma-glutamyl-transferase, GGT; alkaline phosphatase, ALP), aspartate aminotransferase (AST), alanine aminotransferase (ALT) and lactate dehydrogenase (LDH) were obtained preoperatively and at 24 and 48 hrs postoperatively. The results indicated that LC is associated with transient elevation of ALT and AST and the study concluded that fluctuation in the liver function followed by LC are self-limited and are related with any morbidity in patients with a normal liver function.[13]

## CONCLUSION

From the above results, the authors concluded that no alterations occur in terms of mean bilirubin levels in patients undergoing cholecystectomy. However; future research is recommended.

## REFERENCES


1. Laura MS, Eldon AS. Epidemiology of Gallbladder Disease: Cholelithiasis and Cancer. Gut and Liver. 2002; 6(2): 172-187.
2. Rakesh KT. Prevalence and type of biliary stones in India. World J Gastroentero. 2000; 6(3) 4-5.
3. Sefik H, Dragutin K, Kasim M. Comparison of Postoperative Hepatic Function between Laparoscopic and Open Cholecystectomy. Med Princ Pract. 2004; 14(1): 147–150
4. Hasukić S. Postoperative changes in liver function tests: randomized comparison of low- and high-pressure laparoscopic cholecystectomy. Surg Endosc. 2005;19(11):1451-5.
5. Kaldor A, Akopian G, Recabaren J, Alexander M. Utility of liver function tests after laparoscopic cholecystectomy. Am Surg. 2006;72(12):1238-40.
6. Guven HE, Oral S. Liver enzyme alterations after laparoscopic cholecystectomy. J Gastrointestin Liver Dis. 2007;16(4):391-4.
7. Utpal D. Evolution of cholecystectomy: A tribute to Carl August Langenbuch. Indian Journal of Surgery. 2004;66(2) 97-100.
8. Sharma SC, Sharma JP. Comparison of liver function test in patients undergoing cholecystectomy (Open And Laparoscopic): A retrospective study. Indian Journal of Basic and Applied Medical Research. 2014:4(1):511-517.
9. Tauro LF, Sheethal CM, Aithala PSM, Shetty SR, D'souza CS, Rao BSS, et al. Evaluation Of Effects Of Laparoscopic Surgery On Hepatic Function. Journal of Clinical and Diagnostic Research. 2008; 2: 1155-1162.
10. Koirala R, Shakya VC, Khania S, Adhikary S, Agrawal CS. Rise in liver enzymes after laproscopic cholecystectomy: a transient phenomenon. Nepal Med Coll J. 2012;14(3):223-6.
11. Al-Luwaizia KR, Hamadb SO. Changes of liver enzymes and serum bilirubin after laparoscopic cholecystectomy. Ann Coll Med Mosul 2013; 39 (2): 113-117.
12. Robinson TN, Biffl WL, Moore EE, Heimbach JK, Calkins CM, Burch J. Routine preoperative laboratory analyses are unnecessary before elective laparoscopic cholecystectomy. Surg Endosc. 2003;17(3):438-41.
13. Tan M, Xu F-F, Peng J-S, Li DM, Chen LH, Lv BJ. et al. Changes in the level of serum liver enzymes after laparoscopic surgery. World Journal of Gastroenterology: WJG. 2003;9(2):364-367.


**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 02-02-2018; **Published online**: 25-02-2018