Alteration of Liver Function Tests following Laparoscopic Cholecystectomy

Suresh Raj Paudel[1], Narendra Vikram Gurung[1], Arjun Acharya[1], Dillip Baral[1], Laxman Banstola[2]

[1]Department of Surgery, Pokhara Academy of Health Sciences, Western Regional Hospital, Pokhara, Nepal
[2]Department of Pathology, Pokhara Academy of Health Sciences, Western Regional Hospital, Pokhara, Nepal

Correspondence:

Dr. Suresh Raj Paudel, MS
Pokhara Academy of Health Sciences, Western Regional Hospital, Pokhara, Nepal

Email: poudelsuresh6@gmail.com

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ABSTRACT

Introduction: Cholelithiasis is a common surgical problem. Laparoscopic cholecystectomy is the gold standard of treatment for symptomatic cholelithiasis. It requires creation of pneumoperitoneum which has some physiological consequences like rise in liver function tests indicating hepatic hypoperfusion and ischemia in patients who were preoperatively normal.

Materials and methods: A prospective observational study was conducted at Pokhara Academy of Health Sciences, Pokhara from March to July 2022. One hundred patients who underwent elective laparoscopic cholecystectomy meeting inclusion criteria were enrolled. Data collection was done using a structured porforma. Stastical analysis was done SPSS version 21. Data were presented as mean and standard deviation. Appropriate statistical tests were applied and p value of <0.05 was considered significant.

Results: Out of hundred patients, twenty nine percent were male and seventy- one percent were female with mean age of 48.87 years. The post-operative day one serum bilirubin (mean 1.016) ,SGPT-Serum Glutamate Pyruvate Trasaminase (mean 62.56) and SGOT-Serum Glutamic Oxaloacetic transaminase (mean 61.74) were increased as compaired to the pre-operative mean values of 0.649, 34.96, and 35.46 respectively with p value of 0.000 where as mean of post-operative post-oprative day seven values 0.644 , 32.21 , 32.98 were almost near to pre-operative values. Mean of pre-operative(99.03) and post-operative(95.75) ALP-Alkaline Phosphatase were almost comparable.

Conclusion: There was a transient elevation in serum bilirubin, Serum Glutamate Pyruvate Trasaminase, Serum Glutamic Oxaloacetic Transaminase following laparoscopic cholecystectomy due to carbondioxide pneumoperitonium which normalized in the seventh postoperative day.

Keywords: Carbondioxide, Laparoscopic cholecystectomy, liver function tests, pneumoperitoneum.

INTRODUCTION

Gallstones are common surgical problem. Minimal access surgery has become popular for its management. It has changed the face of general surgery. Laparoscopic surgery has replacedopen cholecystectomy and is the gold standard of treatment for symptomatic cholelithiasis.[1] It has become the most common operation performed in general surgical practice and requires creation of pneumoperitoneum. Pneumoperitoneum has its own physiological consequences. Generally intra-abdominal pressure during laparoscopy is set at 12-14 mmHg. The normal value of intra-abdominal pressure is 5 mmHg or less.[2] The normal range of portal venous pressure is around 7-10 mmHg. Both hepatic and splanchnic microcirculation

fall during laparoscopic cholecystectomy with a pneumoperitoneum of 12 mmHg which indicates splanchnic ischemia.[3] The rise in liver function tests (LFT) indicates hepatic hypoperfusion and ischemia in patients who were preoperatively normal.[4] Low pressure laparoscopic cholecystectomy causes less abnormality in liver enzymes in the postoperative period compared with high pressure laparoscopic cholecystectomy. The disturbances after the procedure are self-limited and not associated with any morbidity in patients.[5]

The main objective of this study is to find out the changes in liver function tests after laparoscopic cholecystectomy in first post-operative day and to see their status in follow up (post-operative day seven).

MATERIALS AND METHODS

This is a prospective quantitative study conducted at Western Regional Hospital, Pokhara from March 2022 to july 2022 after ethical clearance from institutional review board. One hundred patients were included in the study. All patients undergoing elective laparoscopic cholecystectomy, who gave written consent for the procedure and those with normal preoperative Liver function tests were included in the study. Patients with altered preoperative liver enzyme level, common bile duct stone, chronic liver diseases, conversion to open cholecystectomy, intra–operative liver bed bleeding and bile duct injury were excluded. A structured proforma was filled for each case of symptomatic cholelithiasis who met the inclusion criteria and were admitted Department of Surgery in Western Regional Hospital for laparoscopic cholecystectomy.

Liver function tests {serum Bilirubin, Serum Glutamate Pyruvate Trasaminase (SGPT), Serum Glutamic Oxaloacetic transaminase (SGOT), and Alkaline Phosphatase (ALP)} were done on the preoperative day in out patient department, first and seventh postoperative day in ward and in follow up respectively and were entered in the proforma along with the demographic characteristics of the patients (age and sex). Statistical analysis was done using SPSS version 21. Data were presented as mean and standard deviation. Appropriate stastistical tests were applied and a p value of <0.05 was considered significant.

RESULTS

Out of one hundred patients enrolled in the study, twenty nine percent were male and seventy- one percent were female with male : female ratio of 0.40. The youngest patient was 19 years old and oldest was 75 years old with mean age of 48.87.

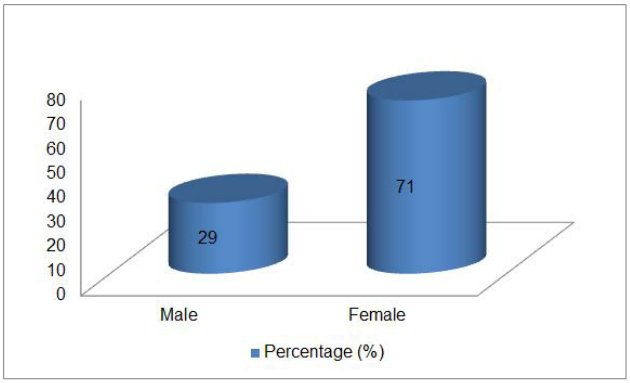

Figure1: Gender distribution of the patients

Table1: Pre-operative and post-operative values of liver function tests.

Variables	Min.	Max.	Mean	Std. deviation
Age (years)	19	75	48.87	14.916
Preop S. bilirubin(mg/dl)	.3	1.8	.649	.3608
Postop1 S. bilirubin (mg/dl)	.3	2.7	1.016	.5488
Postop7 S bilirubin (mg/dl)	.3	1.5	.644	.2801
Preop SGPT (U/L)	11	149	34.96	27.152
Postop1 SGPT (U/L)	19	410	62.56	66.164
Postop7 SGPT (U/L)	15	100	32.21	18.608
Preop SGOT(U/L)	13	101	35.46	20.555
Postop1 SGOT (U/L)	18	357	61.74	47.621
Postop7 SGOT (U/L)	15	100	32.98	15.685
Preop ALP (U/L)	51	198	99.03	36.839
Postop1 ALP (UL)	51	187	95.75	29.119
Postop7 ALP (U/L)	45	140	71.17	21.285

(Preop=Preoperative; Postop1=Post operative Day One; Postop7=Postoperative Day Seven)

Table2: Paired sample statistics of liver function tests after laparoscopic cholecystectomy

Parameters	Mean±S.D	p-value
Preop s. bilirubin Postop1 s. bilirubin	.649 ± .3608 1.016±.5488	0.000
Preop s. bilirubin Postop7 s. bilirubin	.649±.3608 .644±.2801	.701
Preop sgpt Postop1 sgpt	34.96±27.152 62.56±66.164	.000
Preop sgpt Postop1 sgpt	34.96±27.152 32.21±18.608	.159
Preop sgot Postop1 sg0t	35.46±20.555 61.74±47.621	.000
Preop sgot Postop7 sgot	35.46±20.555 32.98±15.685	.160
Preop ALP Postop1 ALP	99.03±36.839 95.75±29.119	.294
Preop ALP Postop7 ALP	99.03±36.839 71.17±21.285	.000

(Preop=Preoperative; Postop1=Post operative Day One; Postop7=Postoperative Day Seven)

The mean of pre-operative , post-operative day one and post-operative day seven serum bilirubin was 0.649 , 1.016 and 0.644 respectively which showed that post-operative day one serum bilirubin was slightly higher (p=0.000) where as pre-operative and post-oprative day seven serum bilrubin mean was comparable. Similarly post-operative day one SGPT (mean 62.58) was higher than pre-operative (mean 34.96) but post-operative day -seven (mean 32.21) and pre-operative (mean 62.58) was compairable. Likewise pre-operative SGOT (mean 35.46) and post operative day seven SGOT (mean 32.98) were almost near but post-operative day one SGOT (mean 61.74) was higher (p=0.000). Pre-operative ALP (Mean 99.03) and post-operative day one ALP (Mean 95.75) were almost similar (p=0.29) but post-operative day seven was slightly low (Mean 71.17). These results showed that post-operative day one serum bilirubin , SGPT and SGOT were higher than pre-operative values while post-operative day seven LFT values were comparable. There was no significant chage in values of ALP in post-operative day one compared to preoperative value.

DISCUSSION

Gallstones is common disease among people particularly in Western population. Approximately 6 percent of men and 9 percent of women have gallstones.[6] The majority of patients with gallstones are asymptomatic and will remain so throughout their lives. Of those with incidental (asymptomatic) gallstones, approximately 15 to 25 percent will become symptomatic after 10 to 15 years of follow-up.[7] The introduction of minimally invasive procedure has revolutionized the field of surgery. Laparoscopic cholecystectomy is one of the most commonly performed abdominal surgical procedures, and in developed countries about 90 percent of cholecystectomies are performed laparoscopically.[8] Carbondioxide gas is used for creating pneumoperitoneum. The increased intra-abdominal pressure (normal 5 mmHg) due to pneumoperitoneum results in hemodynamic alteration and changes are seen in femoral, renal, hepatic, portal blood flow.[9] The increased intra-abdominal pressure during pneumoperitoneum can decrease splanchnic circulation, resulting in reduced total hepatic blood flow and bowel perfusion.[10] However,carbondioxide induced hypercapnia can cause direct splanchnic vasodilatation. So the overall effects on splanchnic circulation are not clinically significant.

The study by Bellad A et.al. in J.N. Medical College, KAHER, Belgaum, Karnataka, India showed that there is transient elevation of serum bilirubin, hepatic enzymes SGPT, SGOT after laparoscopic cholecystectomy and the major causative factor was carbondioxide pneumoperitoneum.[11] This study is similar to our study.

In our study post-operative serum bilirubin, SGPT and SGOT was increased in post-operative day one but ALP was almost near to pre-operative value. Godara R et. al. conducted the study in 100 patients

in Post Graduate Institute of Medical Sciences, Rohtak, Haryana, India and observed a temporary rise in hepatic enzymes levels (serum bilirubin, SGPT, SGOT) after laparoscopic cholecystectomy in 24 hours that reverted back to almost pre-operative levels in the seventh post-operative day. However, there was no statistically significant change ALP. They explained in their study that this change is probably due to fall in hepatoportal blood flow caused by raised intraperitoneal pressure by carbondioxide insufflation. But there was no apparent clinical changes in patients as a result of this alteration.[12] Their observation was similar to our study.

The study conducted in the Department of Surgery at MMIMSR, Ambala by Singal R et. al observed that there was rise in the levels of serum bilirubin, SGPT and SGOT after 24 hrs of surgery from the preoperative value that returned to near normal value after 72 hrs of surgery except that of ALP levels, ALP levels showed near pre-operative value after 24 hrs of surgery and then slight fall after 72 hrs which was within the normal limit and this finding is comparable to our study. They also concluded that this transient elevation of serum bilirubin, SGPT and SGOT after laparoscopic cholecystectomy is due to carbondioxide pneumoperitoneum, diathermy, surgical manipulations and arterial injury . These changes return to normal in 3-4 days and have no clinical consequences in patients with normal hepatic function.[13]

The study by Al-Luwaizia KR noticed that following laparoscopic cholecystectomy the serum level of certain liver enzymes rise markedly in patients which were preoperatively normal.[14] Likewise the study done by Syed Ibrahim et. al. in department of General Surgery, Madurai Medical College And Hospital, India, in 60 patients observed the increase in level of serum bilirubin, SGPT, SGOT during first 24 hours after surgery. These changes came back to near preoperative value by post-operative day 5 which was similar to our study.[15] They explained in their study that these changes were due to short-term reduction in hepatic blood flow caused by carbondioxide pneumoperitoneum. No obvious clinical changes were seen in the patients due to these transient changes.

Halevy postulates about many possible explanations for alteration of liver enzymes following laparoscopic cholecystectomy. When intra-abdominal pressure Increases during pneumoperitonium there may be decrease in portal venous and hepatic artery flow. This results in decreased hepatic perfusion leading to transient rise of liver enzymes and serum bilirubin. This temporary rise of liver enzymes during laparoscopic cholecystectomy is usually self-limiting. It does not signify marker of any complication in patients having normal hepatic function. There may be compression of liver during retraction of gall bladder. This compressive effect on liver can result in release of hepatic enzymes in the blood. Retraction of gall bladder while operation causes temporary kink of the extrahepatic ducts resulting in increased pressure in lumen causing release of these enzymes. There can be damage to liver parenchyma as a result of lateral spread of diathermy.[16] Similarly Tan M et. al. tested the liver function of patients who underwent lap cholecystectomy and suggested that transient postoperative increase in liver function tests in lap cholecystectomy patients might be due to carbondioxide pneumoperitoneum, squeeze pressure effect on the liver, prolonged use of diathermy to the liver surface and spread of heat to liver parenchyma.[17] We believe that the results of this study could possibly be explained by the postulates given by Halevy and Tan.

Few modifications during laparoscopic surgeries like gasless techniques, minimal diathermy use, use of harmonic scalpel and ligasure might be associated with less frequent alterations in hepatic enzymes.[12]

CONCLUSION

There was transient elevation in Serum bilirubin, Serum Glutamate Pyruvate Trasaminase, Serum Glutamic Oxaloacetic transaminase following laparoscopic cholecystectomy due to carbondioxide pneumoperitonium which changed to near normal values with time.

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