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STUDY IN CHANGE IN LIVER ENZYMES AFTER LAPROSCOPIC CHOLECYSTECTOMY: A RETROSPECTIVE STUDY

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ABSTRACT: Aim of the study was to study the effect of pneumoperitoneum on liver function tests, Serum aspartate aminotransferase (AST), Alanine aminotransferase (ALT), gamma glutamyl-transferase (GGT), lactate dehydrogenase (LDH) and alkaline phosphatase (ALP) in patients who had undergone laparoscopic cholecystectomy (LC) and to compare the alterations in liver function tests with those patients who underwent open cholecystectomy (OC). **MATERIAL AND METHODS** Indoor records of 201 patients were taken who were admitted to the hospital with complain of symptomatic gall stone diseases from 1 August 2011 to 31 Jul 2014. Out of 201 patients, 180 patients underwent Laparoscopic cholecystectomy at intraperitoneal pressure 12-15 mmHg and 21 patients underwent open cholecystectomy. Two groups were made for the purpose of study, laparoscopic cholecystectomy (LC) group and open cholecystectomy (OC) group. Serum levels of AST, ALT, GGT, LDH and ALP were assessed preoperatively and 24 hours after the surgery and finally at 3 weeks after the surgery, in both the groups i.e. Laparoscopic cholecystectomy (LC) group and open cholecystectomy (OC) group. Laparoscopic surgeries other than Laparoscopic cholecystectomy, CBD stone and CBD stricture, gas used other than CO₂ for peritoneal inflation, Deranged LFT in pre-operative period were excluded from the study. **RESULTS** Statistical analysis revealed that there is significant alteration of liver enzymes AST, ALT, GGT and LDH in patients who underwent laparoscopic cholecystectomy compared with patients underwent open cholecystectomy. **CONCLUSION** Altered liver enzymes which occurred after laparoscopic cholecystectomy may be attributed to effect of intraoperative pneumoperitoneum on hepatic blood flow. Although most of these changes return to normal limit after 3 weeks of surgery, this does not seem to be clinically important but care should be taken before performing Laparoscopic cholecystectomy in patients with hepatic insufficiency.

KEYWORDS: Laparoscopic cholecystectomy, pneumoperitoneum, liver function tests, open cholecystectomy.

INTRODUCTION Laparoscopic cholecystectomy is considered to be a gold standard for symptomatic gall stones disease in today's era.¹ Creation of working space with the help of insufflating inert gas like CO₂ is essential for lap cholecystectomy.² Pneumoperitoneum with CO₂ causes many physiological changes which depend on amount of intra-abdominal pressure used intraoperatively and time taken to complete the surgery.^{3,4} Increased intra-abdominal pressure has significant physiological effect on cardio pulmonary and renal system.^{5,6} Increased IAP also leads to significant impairment of hepatic perfusion.⁷ Pneumoperitoneum created with CO₂ for lap cholecystectomy in head up position leads to greater risk of decrease in cardiac output and hence affecting hepatic perfusion.⁸ Although lap cholecystectomy offers many advantages over open cholecystectomy but concerns are arising regarding its effect on homeostasis.

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One of the most important hemodynamic changes is the alteration in liver function due to transient reduction of hepatic blood flow caused by pneumoperitoneum.⁹

The present study aimed to study the effect of pneumoperitoneum on Serum liver enzymes after laparoscopic cholecystectomy performed under constant intraperitoneal pressure (14mmHg) and compare its results with that of open cholecystectomy.

MATERIAL AND METHODS This study is a retrospective study done for three years from 1st august 2011 to 31st Jul 2014 in tertiary care hospital AIMSR, Bathinda, Punjab. Study was carried out on 201 patients who presented to surgery department with symptomatic gall stone disease. Laparoscopic cholecystectomy hereafter referred to as lap-chole was done in 180 patients and during the same interval 21 patients underwent open cholecystectomy for the same disease after obtaining informed written consent. For the purpose of study two groups were made, one group consisted of patients who had undergone Laparoscopic cholecystectomy and the other group consisted of patients who had undergone open cholecystectomy with uniform anesthesiological protocol. Serum levels of AST, ALT, ALP, LDH, and GGT were obtained preoperatively and Post-operatively at 24hrs and 3 weeks of surgery.

INCLUSION CRITERIA Patients of both the genders- males and females aged between 25 to 60 yrs who presented with symptomatic gall stone disease.

EXCLUSION CRITERIA All non- hepatobiliary laparoscopic procedures, gas other than CO₂ used for pneumoperitoneum and deranged LFTs diagnosed preoperatively.

DATA ANALYSIS data was collected and was analysed statistically by SPSS 17. P values were calculated using paired t test and were considered significant below 0.05.

RESULTS There were total 201 patients of symptomatic gall stone disease. Out of 201 patients, 180 patients underwent laparoscopic cholecystectomy and 21 patients underwent open cholecystectomy. For the purpose of study two groups were made, group 1 (Laparoscopic group, LC Group), group 2 (open cholecystectomy, OC Group) Patients undergoing lap chole had Post-operative increase in AST, ALT, LDH, GGT and ALP. Slow return to normal value of liver function tests occurred after 48 hrs to 3 weeks Post-operatively.

The increase in AST and ALT was statistically significant which was correlated to increased intra-abdominal pressure and to the duration of pneumo peritoneum. In both the groups there was female predominance. Age group was 16- 70 in group LC and 24-72 in group OC. The usual CO₂ pressure during surgery was 12 mm Hg – 15 mm Hg following the similar anaesthetic protocols in all the patients. In both the groups NSAIDS was used to manage Post operative pain. GB dissection was carried out with diathermy.

The change between the means of Pre-operative and Post-operative values of liver enzymes were calculated. There was significant difference for the values of AST, ALT, GGT whereas there was only slight change in the values of ALP between Pre-operative and Post-operatively.

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Enzymes	Pre operative. mean (IU/L)	SD	Post operative mean after 24 hrs (IU/L)	SD	P value
AST	32.26	9.23	96.12	27.64	<0.0001
ALT	30.46	6.51	92.33	19.35	<0.0001
GGT	35.89	8.65	108.17	25.95	<0.0001
LDH	219.95	15.98	441.73	32.55	<0.0001
ALP	54.63	15.39	55.01	15.31	0.1616

Table 1: Liver Enzyme values on first Post-operative day in Laparoscopic cholecystectomy group

In Laparoscopic cholecystectomy group the mean preoperative values of AST being 32.26 IU/L increased to 96.12 IU/L after 24hrs of Post operative & regressed back to 32.3 IU/L after 3 weeks of Post operative period. Similarly the mean value of ALT enzyme which were 30.46 IU/L Pre-operatively increased to 92.33 IU/L when tested after 24 hrs of operation and regressed back to 30.39 IU/L after 3 weeks. The mean values of enzyme GGT measured preoperatively as 35.89 IU/L, increased to 108.17 IU/L after 24hrs of operation & returned to 36.11 IU/L after 3weeks. LDH showed mean Pre operative value of 219.95 IU/L, increased to 441.73 IU/L after 24 hrs of operation and returned to normal values of 220.27 IU/L after 3 weeks. However the mean preoperative value of ALP 54.63 IU/L altered minimally to 54.78 postoperative on day 1and 54.77 IU/L being value on day 3.

Enzymes	Pre operative mean (IU/L)	SD	Post operative (after 24 hrs) Mean (IU/L)	SD	P value
AST	28.52	6.18	29.00	6.53	0.1622
ALT	27.33	5.27	26.85	4.77	0.2267
GGT	36.95	8.00	36.52	8.19	0.2059
LDH	176.42	38.42	177.00	38.64	0.2341
ALP	52.23	9.97	52.76	10.49	0.1713

Table 2: Liver Enzyme values in Open Cholecystectomy operation group

ENZYMES	Pre operative mean	SD	Post operative (after 3wks)	SD	P value
AST	32.25	9.23	32.33	9.38	0.2665
ALT	30.45	6.51	30.39	6.55	0.2118
GGT	35.89	8.65	36.11	8.54	0.1895
LDH	219.95	15.98	220.27	16.18	0.1383
ALP	54.63	15.39	54.77	15.16	0.2433

Table 3: Liver enzymes values on 3rd week of Post operative period Laparoscopic cholecystectomy group

There were 21 patients having symptomatic gallstones. Mean Pre operative value of AST is 28.52 IU/L which was 29.00 after 24 hrs. Mean Pre- operative value of ALT is 27.33 which was 26.85 after 24 hrs. Mean Pre operative value of GGT is 36.95 which was 36.52 after 24 hrs. Mean Pre-

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operative value of LDH is 176.42 which was 177.00 after 24. Mean Pre operative value of ALP is 52.23 which was 52.76. There by suggesting that the difference in liver enzyme values in Open Cholecystectomy operation between the preoperative and Post operative period is statistically insignificant.

Fig. 1: Liver Enzyme values in Open Cholecystectomy operation group

DISCUSSION: In today's era laproscopic cholecystectomy is considered to be the gold standard for the treatment of symptomatic gall stones. But as with any surgical procedure, it is also associated with some complications. Bile duct injuries are among the serious complications which are not easy to diagnose preoperatively and are detected Post operatively.¹⁰

An alteration of liver function is not always attributed to biliary pathology but may be because of increased pneumoperitoneal pressure leading to hepatic dysfunction. Pneumoperitoneum causes decrease in cardiac output & stroke volume during laproscopic cholecystectomy.^{11,12} Halevy et al in 1994 first studied that laproscopic cholecystectomy may lead to alteration of liver enzymes.¹³ Besides pneumoperitoneum increased intra-abdominal pressure other causes which lead to deranged liver functions are-squeeze pressure effect on the liver, excessive use of diathermy, pull on the gall bladder or passage of micro calculi in the bile duct during manipulation of gall bladder which are usually limited in open cholecystectomy.¹³

Intraperitoneal pressure used for laproscopic cholecystectomy is higher than the pressure in the portal venous system which impedes portal circulation which in turn reduces portal flow up to 50%, hence causes depression of the hepatic reticular endothelial system.¹⁴ Thus change in liver function tests is directly proportional to duration & pressure used for pneumoperitoneum.¹⁵ Laproscopic cholecystectomy might not be the right choice in patients having significant deranged liver function tests or patients with severe liver diseases or liver cirrhosis because it can further deteriorate the liver function.¹⁶

Whereas some of the recent studies have shown that laproscopic cholecystectomy can safely be performed with child classes A & B cirrhosis of liver with not much significant complications.¹⁷ Besides gall bladder surgery other laproscopic procedure like colorectal or other abdominal surgeries also associated with altered postoperative liver function tests.¹⁸ Immediate change in LFT

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in Post-operative laproscopic procedures should not cause much concerns as they usually return to normal without intervention.

In our study there was high level of change of AST, ALT & GGT whereas level of ALP remain minimally changed with exception of minimal number of cases, all the values returned to normal at the follow-up after 3 weeks. Open cholecystectomy earlier considered to be gold standard for symptomatic gall stones however, it is associated longer duration of hospital stay, significant postoperative pain & 6-8 weeks recovery period whereas LC has an advantage of decreased Post operative pain & decreased Post operative stay to hospital & early recovery.^{19,20}

CONCLUSION: Liver function tests include AST, ALT, GGT, ALP & bilirubin. Raised values of AST, ALT & GGT indicates deranged hepatocellular function whereas any rise of ALP & bilirubin represents biliary obstruction. Alteration of liver function after laproscopic cholecystectomy should not cause major concern as they usually return to normal without intervention. Though in patients with severe liver disease with significantly deranged liver function tests preoperatively, laproscopic surgeries may be used with cautious.

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