

Original article:

Comparison of liver function test in patients undergoing cholecystectomy (Open And Laparoscopic): A retrospective study.

¹Subhash Chandra Sharma, ²Janmejai Prasad Sharma

¹Assistant Professor, Department of General Surgery, SGRRIMHS & Associated SMIH, Patel Nager, Dehradun, Uttarakhand, India

²Associate Professor, Department of General Surgery, SGRRIMHS & Associated SMIH, Patel Nager, Dehradun, Uttarakhand, India

Corresponding author: Dr Subhash Chandra Sharma Assistant Professor, Department of General Surgery, SGRRIMHS & Associated SMIH, Patel Nager, Dehradun, Uttarakhand, India

Abstract:

Background: Laparoscopic cholecystectomy is considered as the treatment of choice for gallstones and inflammatory gallbladder. It is always considered as better than classical open one due to various advantages. Pneumo-peritoneum is created in abdominal cavity with the help of insufflating inert gas like CO₂ which is most essential step for laparoscopic cholecystectomy. Due to this pneumo-peritoneum several physiological changes in the patients have been reported especially in liver function.

Methods: All patients were divided into two groups consisting of Group I (155 patients) referred for laparoscopic cholecystectomy and Group II (45 patients) posted for open cholecystectomy. We observed serum levels of liver enzymes (SGOT, SGPT, ALP, GGT and LDH) in both the groups. The liver enzymes were noted both preoperatively, one day and 21 days post-operatively. All the parametric data was analysed using Student's t-test and non-parametric data using Chi-Square/Fisher test.

Results: The significant alteration in AST, ALT & GGT was observed after laparoscopic surgery but values returned to normal after three weeks. Conclusion: Patients suffering with liver disease with significantly disturbed liver function tests before surgery, open cholecystectomy can be preferred treatment.

Keywords: Cholecystectomy, Laparoscopy, Impaired liver functions, Pneumo-peritoneum.

Introduction:

Cholecystectomy is defined as the surgical amputation of the gallbladder. It is a universal management of symptomatic gall stones and other diseases related to gall bladder. Cholecystectomy comprises of two procedures, laparoscopic cholecystectomy, and an older procedure which is more invasive, open cholecystectomy.¹

Laparoscopic cholecystectomy is considered as the treatment of choice for gallstones and inflammatory gallbladder, but still there are some contraindications to the laparoscopic surgery. The reason behind this is that the patients undergoing

open surgery are more exposed for infections. Occasionally, during operation, cholecystectomy can be transformed from laparoscopy to open for practical reasons or to avoid complication.^{2,3}

Laparoscopic surgery is always considered as better than classical open one due to various advantages. Because of small incisions complications like pain and haemorrhage are reduced and time required for recovery are squatted. The key feature in laparoscopic surgery is the custom of a laparoscope, a long optic cable system which allows easy accessibility of site.^{4,5}

Laparoscopic cholecystectomy needs numerous miniature incisions in the abdomen through which operating ports, surgical instruments and a video camera are positioned into the abdominal cavity.⁶ The camera lightens the surgical pitch and video monitor receives an image of organs and tissues, which is clear and magnified. By receiving video information, the surgeon performs the operation by surgical instruments manipulation through these operating ports.⁷

Pneumo-peritoneum is created in abdominal cavity with the help of insufflating inert gas like CO₂ which is most essential step for laparoscopic cholecystectomy. Due to this pneumo-peritoneum several physiological changes in the patients have been reported. These changes hinge on an amount of intra-abdominal pressure used during operation and time needed for completion of the surgery. Besides this raised intra-abdominal pressure has noteworthy effect on cardiac, pulmonary and renal system. Increase in pressure also causes substantial hepatic impairment. During cholecystectomy head up position is maintained for creating pneumo-peritoneum which leads to decline in cardiac output and thus affecting hepatic perfusion. Though laparoscopic cholecystectomy bids many benefits over open cholecystectomy but fears are arising about its effect on liver functions.^{8,9}

Materials and Methods

After obtaining Institutional Ethical approval and written informed consent, we recruited 200 patients posted for elective laparoscopic cholecystectomy between 18-60 years of age from September 2013-August 2014. All patients with symptomatic gall stones from our department of surgery underwent anaesthesia fitness before taken up for surgery. Patient with extra-hepatic diseases, planned to go for laparoscopic procedures other than cholecystectomy, deranged preoperative liver function tests, chronic cardiac/kidney disease or

any other associated co-morbid illness in which anaesthetist did not give fitness for surgery were excluded from our study.

All patients were divided into two groups consisting of Group I (155 patients) referred for laparoscopic cholecystectomy and Group II (45 patients) posted for open cholecystectomy. Both the groups received similar anaesthetic procedure. All patients received similar induction/relaxation doses of anaesthetic drugs. We observed serum levels of liver enzymes (SGOT, SGPT, ALP, GGT and LDH) in both the groups. The liver enzymes were noted both preoperatively, one day and 21 days post-operatively. We compared the preoperative values of liver enzymes with the post-operative ones.

Statistical Analysis: All the parametric data was analysed using Student's t-test and non-parametric data using Chi-Square/Fisher test whichever is applicable. Data was analysed using statistical package for social sciences (SPSS). A p value of <0.05 was considered statistically significant.

Results

All patients were successfully enrolled in our study and no drop outs were observed during the study period. All patients were comparable with respect to demographic variables and no statistical difference was observed with respect to age, sex, height of the patients. However, female predominance was observed in both the study groups as can be explained from the fact that the females carry more preponderance of gall stones compared to males.

The intra-abdominal pressure during pneumoperitoneum was 12-14 mm of Hg in all the patients undergoing Laparoscopic Cholecystectomy. All operations were performed under general anaesthesia with similar anaesthesia protocol. Postoperative pain was taken care of by

Inj. Diclofenac (75 mg IM) and gall bladder was successfully dissected using diathermy.

The mean preoperative and one day postoperative value of SGOT in patients undergoing Laparoscopic cholecystectomy was 29.85 ± 7.83 IU/L and 73.27 ± 11.52 IU/L respectively ($p=0.001$) [Table 1]. Similar statistical significance in patients undergoing Laparoscopic cholecystectomy was observed on comparing Serum SGPT levels at preoperative and one day postoperatively (31.36 ± 9.41 & 77.59 ± 17.37 IU/L) ($p=0.001$). The mean preoperative and one day postoperative Serum GGT and LDH in patients of Laparoscopic cholecystectomy was also observed to be statistically significant ($p=0.001$) [Table 1]. However, Serum ALP levels was

observed to be comparable during preoperative and one day postoperative time [Table 1]

The mean preoperative and postoperative Serum SGOT, SGPT, GGT, LDH and ALP was observed to be comparable in patients undergoing open cholecystectomy [Table 2].

In patients undergoing laparoscopic cholecystectomy, the mean preoperative and 21 days postoperative serum liver enzymes studied are found to be statistically insignificant [Table 3, Figure 1]. Thus, it took a long duration for the liver enzymes to get back to normal serum levels after the cholecystectomy. Similarly, the patients underwent open cholecystectomy had near normal mean preoperative Serum SGOT, SGPT, GGT, LDH and ALP levels when compared 21 days postoperatively [Table 4, Figure 2].

Table 1:Preoperative and Post-operative liver enzymes in patients undergoing laparoscopic Cholecystectomy after 1 day of surgery. (Group I).

Enzymes (IU/L)	Preoperative (Mean \pm SD)	Post-operative (Mean \pm SD) [After 1 day]	P value
SGOT	29.85 ± 7.83	73.27 ± 11.52	0.001*
SGPT	31.36 ± 9.41	77.59 ± 17.37	0.001*
GGT	30.08 ± 10.82	68.51 ± 16.74	0.001*
ALP	48.81 ± 7.90	51.32 ± 12.26	0.23
LDH	187.37 ± 26.49	469.23 ± 20.97	0.001*

Table 2: Preoperative and Post-operative liver enzymes in patients undergoing open Cholecystectomy (Group II).

Enzymes (IU/L)	Preoperative (Mean \pm SD)	Post-operative (Mean \pm SD) [After 1 day]	P value
SGOT	31.15 ± 8.14	33.41 ± 11.52	0.48
SGPT	30.24 ± 8.23	32.21 ± 7.89	0.73
GGT	31.75 ± 6.63	35.61 ± 6.19	0.71
ALP	51.69 ± 5.52	50.04 ± 6.73	0.39
LDH	203.19 ± 10.95	213.39 ± 9.16	0.81

Table 3: Preoperative and Post-operative liver enzymes in patients undergoing laparoscopic Cholecystectomy after 21 days of surgery. (Group I).

Enzymes (IU/L)	Preoperative (Mean ± SD)	Post-operative (Mean ± SD) [After 21 day]	P value
SGOT	29.85 ± 7.83	31.79 ± 6.89	0.68
SGPT	31.36 ± 9.41	34.41 ± 8.62	0.47
GGT	30.08 ± 10.82	33.91 ± 6.99	0.51
ALP	48.81 ± 7.90	52.39 ± 8.32	0.79
LDH	187.37 ± 26.49	198.67 ± 22.19	0.61

Table 4: Preoperative and Post-operative liver enzymes in patients undergoing open Cholecystectomy after 21 days of surgery. (Group II).

Enzymes (IU/L)	Preoperative (Mean ± SD)	Post-operative (Mean ± SD) [After 21 day]	P value
SGOT	31.15 ± 8.14	32.28 ± 9.73	0.81
SGPT	30.24 ± 8.23	30.91 ± 8.37	0.23
GGT	31.75 ± 6.63	33.58 ± 7.49	0.57
ALP	51.69 ± 5.52	53.31 ± 6.91	0.69
LDH	203.19 ± 10.95	194.51 ± 9.44	0.43

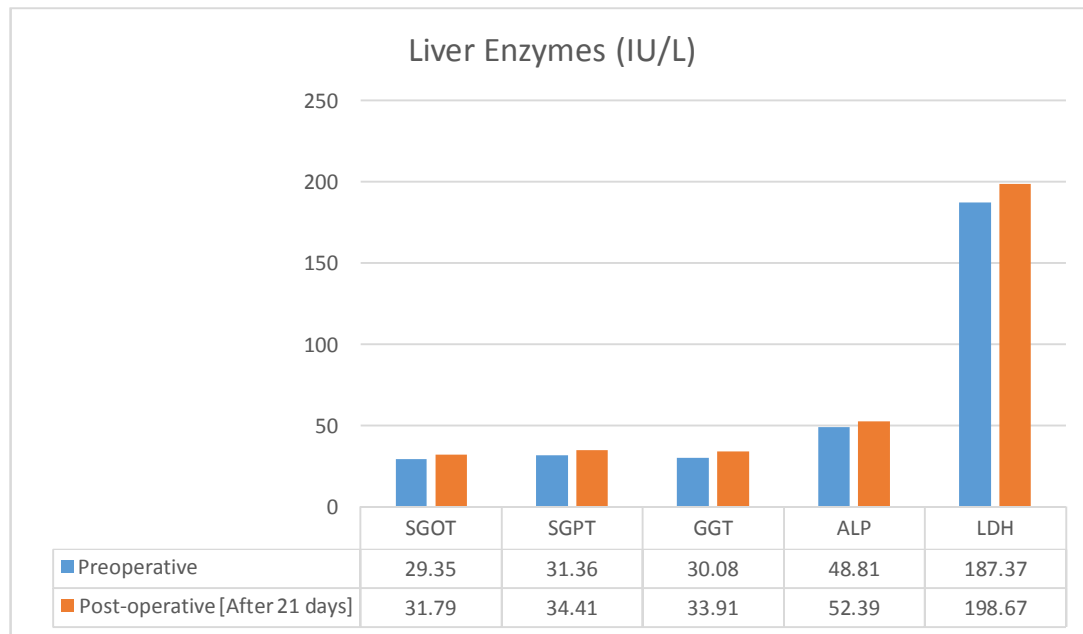


Figure 1: Preoperative and Post-operative liver enzymes in patients undergoing laparoscopic Cholecystectomy (Group I).

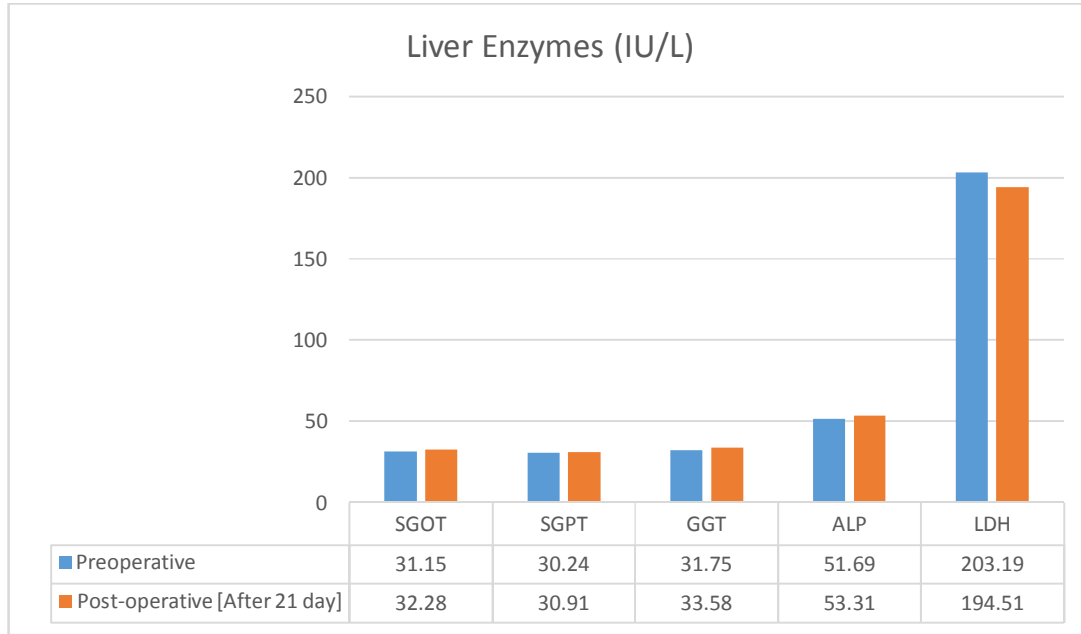


Figure 2: Preoperative and Post-operative liver enzymes in patients undergoing open Cholecystectomy (Group II).

Discussion:

Now a days the surgery of choice for symptomatic gall stones is laparoscopic cholecystectomy. But similar to any surgical technique, it is also allied with certain hitches. Bile duct injury is one of the grave complications. Another problem with this complication is that it is not easy to detect bile duct injury preoperatively as well as after surgery.^{10,11}

Another important risks associated with laparoscopic cholecystectomy are hypothermia and peritoneal injury due to exposure to cool and dry CO₂during insufflation.¹²However, surgical humidification therapy uses the humidified and heated CO₂ which has shown the reduction of risk.¹³

Countless patients with prevailing pulmonary disease might not bearpneumo-peritoneum causing a need for conversion of laparoscopic surgery to open surgery.

Some amount of CO₂ which was blown into the abdominal cavity is not completely removed

through the incisions during surgery. The pressure of gas tends to increase, and pushes the thoracic diaphragm up and can apply pressure on phrenic nerve. This results in a sensation of pain in patient's shoulders.¹⁴

The altered liver function is not always because of biliary injury but might be because of pneumo-peritoneal pressure resulting in hepatic dysfunction. As mentioned earlier, pneumo-peritoneum causes decline in cardiac output & stroke volume.¹⁵A study in 1994¹⁶ first showed that laparoscopic cholecystectomy can cause amendment of liver enzymes. Other factors, besides pneumo-peritoneum that can lead to disturbed liver functions are pressure effect on the liver, extremerpractice of diathermy, jerk on the gall bladder or pushing of small calculi in the bile duct are usually restricted in open cholecystectomy.

Intra-peritoneal pressure required in laparoscopic cholecystectomy is much higher than the portal venous pressure which hinderscirculation of portal

system which automatically reduces portal flow up to half, hence causing depression in the hepatoreticular endothelial system. So, by this study we found that laparoscopic cholecystectomy is not the accurate choice in patients with deranged liver functions, severe liver diseases like cirrhosis. However some of the current studies advocate that laparoscopic cholecystectomy can be the preferred treatment for patients with child classes A & B cirrhosis of liver.^{17,18}

In this study besides ALP there was significant alteration of AST, ALT & GGT. But all readings showed normal value after 3 weeks. So we can say

that open cholecystectomy is still preferred surgery for symptomatic gall stones in certain condition. However, it is related with lengthier hospital stay duration, major postoperative pain & prolonged recovery period.

Conclusion:

Modification in liver function (increase AST, ALT & GGT) after laparoscopic cholecystectomy are not of major apprehension as they generally return to normal values without any intervention. However in patients suffering with liver disease with significantly disturbed liver function tests before surgery, open cholecystectomy might be preferred.

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