

Study of Changes in Hepatic Enzymes after Laparoscopic SurgeryMamta¹, Vikas Kumar², Alok Kumar³¹Senior Resident, Department of General Surgery, NMCH, Patna²Senior Resident, Department of Orthopaedic Surgeon, Asian City Hospital, Patna³Assistant Professor, Department of General Surgery, NMCH, Patna

Received: 17-11-2023 / Revised: 10-12-2023 / Accepted: 09-01-2024

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Conflict of interest: Nil

Abstract:

Background and Objectives: The purpose of this study was to investigate the effect of laparoscopic surgeries on liver function in humans and the possible mechanisms behind such effect. The modern era has witnessed a vast change in the field of medicine. With the advances in science and technology and better access to a variety of services. The purpose of this study was to investigate the effect of laparoscopic surgeries on liver function in humans and the possible mechanisms behind such effect. To evaluate the effects of laparoscopic surgery on liver enzymes Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT), Alkaline Phosphatase (ALP) and serum bilirubin.

Material and Methods: The department of General Surgery at NMCH, Patna. 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 level of serum bilirubin, serum alanine amino transferase (ALT), serum aspartate aminotransferase (AST) and serum alkaline phosphatase. The time of CO insufflation was also measured.

Conclusion: Transient elevation of hepatic enzymes occurs after laparoscopic surgery. CO pneumoperitoneum is the major causative factor.

Keywords: Laparoscopic Surgery, Liver Enzyme, Pneumoperitoneum.

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Introduction

The purpose of this study was to investigate the effect of laparoscopic surgeries on liver function in humans and the possible mechanisms behind such effect. The modern era has witnessed a vast change in the field of medicine [1]. With the advances in science and technology and better access to a variety of services available in various fields, the concept of surgery has changed from bigger incision - better surgeon to exactly the opposite in the field of laparoscopic surgery, better results with least damage both in terms of life, tissue and cosmesis [2]. Some of the diseases which were not tackled due to fear of damage to surrounding structures during access has presently been treated easily with laparoscopic surgery. Laparoscopy has had a profound influence on management of patients like in cases with impalpable testes, gallbladder disease, and Hirschsprung's disease [1]. Everything comes with advantages and disadvantages. With the interest to achieve maximum result with the best cosmesis, advances like laparoscopy, NOTES are all becoming popular and being widely accepted and practiced [3]. But unfortunately, very little emphasis is being given on the adverse effects of laparoscopy on the patient's body. Liver function abnormalities are one of the known

effects of laparoscopic surgery. The level of certain serum liver enzymes rise markedly in most patients who have a normal LFT pre-operative. Little has been studied of this abnormality, hence we decided to undertake a study to compare the changes in serum liver enzymes pre-operative and post operation [4].

Objectives

To evaluate the effects of laparoscopic surgery on liver enzymes Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT), Alkaline Phosphatase (ALP) and serum bilirubin.

To correlate the duration of laparoscopic surgery with elevation of liver enzymes

Material and Methods

This is prospective study was conducted to evaluate the effect of laparoscopic procedures on liver function. The patients included in the study were selected by purposive sampling method from those who underwent laparoscopic surgery in Nalanda Medical College and Hospital Patna Bihar. Study duration of two years. All the patients studied were selected

for laparoscopic procedures after they underwent routine history taking, physical examination and investigations to exclude pre-existing liver diseases or generalized debility. Those selected had normal values of serum liver enzymes prior to the operations. Serum bilirubin was measured by Identikit using calorimetry. AST and ALT were measured by Raichem spectrophotometer capable of accurate measurement at 340nm. Serum alkaline phosphatase was measured by Raichem Spectrophotometer or calorimeter capable of accurately measuring absorbance changes at 405 nm. During the surgery, the intraabdominal pressure (IAP) was maintained at a range of 12-14 mmHg. The CO₂ insufflation time was recorded in each procedure. All patients had a urinary catheter introduced before the surgery. Peri-operative antibiotics were administered in all

patients.

Results

Out of the 60 patients in the study population, 29 patients (48.3%) had undergone cholecystectomy, and 15 patients (25%) underwent appendicectomy. 6 patients (10%) had undergone hernioplasty (TAPP). 2 patients (3.3%) had undergone Laparoscopic Assisted Vaginal Hysterectomy, ovarian cystectomy and Salpingectomy each.

The serum bilirubin level increased significantly within 24-48 hrs following laparoscopic surgery and it came down within a week's time.

Parameter: S. ALP (U/L)

Table 1:

(I) factor1	(J) factor1	Mean Difference(I-J)	Std. Error	Hange (%)	p	
						HS
Pre	Day1	-42.233	4.263	-40.68	0.000	HS
Day7		-4.200	1.291	-4.05	0.006	HS
Day1	Day7	38.033	4.245	26.04	0.000	HS

When compared to pre-op levels S. Alkaline phosphatase values increased minimally in post-op day 1. This value came down to near pre-op levels by post-op day 7.

Table 2: Parameter: SGPT (U/L)

(I) factor1	(J) factor1	Mean Difference (I-J)	Std. Error	hange(%)	p	
						HS
Pre	Day1	-12.563	0.985	-71.91	0.000	HS
Day7		-2.500	0.360	-14.31	0.000	HS
Day1	Day7	10.063	0.982	33.51	0.000	HS

When compared to pre-op levels SGPT values increased significantly in post-op day 1 (P=0.001). This value came down to near pre-op levels by post-op day 7.

Table 3: Parameter: SGOT (U/L)

	N	Minimum	Maximum	Mean	Std. Deviation	ANOVA F	p value
Pre	60	13.0	42.0	22.567	5.0969	157.497	0.000
Day 1	60	22.0	86.0	38.633	12.1724		HS
Day 7	60	13.0	50.0	25.350	6.1031		

When compared to pre-op levels SGOT values increased significantly in post-op day 1 (P=0.001). This value came down to near pre-op levels by post-op day 7.

When compared to pre-op levels S. Alkaline phosphatase values increased minimally in post-op day 1. This value came down to near pre-op levels by post-op day 7.

Table 4:

	Serum Bilirubin	SGPT	SGOT	SerumALP
CO ₂ insufflation Pearson Correlationtime (min)	0.389	-0.061	0.331	0.075
Sig. (2-tailed)	0.00020 HS	0.644	0.01 HS	0.571
N	60	60	60	60

we have found that there is a significant correlation between the CO₂ insufflation time and the cases with elevated liver enzymes level.

Discussion

The progress in laparoscopic procedures has largely been due to the technological advances in endoscopic optics, video cameras and endoscopic instrumentation [5]. The advantages of small incisions reduced postoperative pain and discomfort, shorter hospital

stay, early ambulation and return to work have increased the popularity of laparoscopic procedures. the intraoperative requirements of laparoscopic surgery produce significant physiological changes, some of which are unique to these procedures [6]. Several studies have disclosed unexplained changes in post-operative liver function in patients undergoing laparoscopic procedures. CO₂ pneumoperitoneum might be one of the main reasons for this change of serum liver enzymes, as this is the one of the main

differences laparoscopic surgeries had when compared with open surgeries [7]. In the 60 patients who constituted our study population, 32 were male patients and 28 were females. All patients were between 15 and 75 years of age. Majority of the patients were below 50 years (i.e. 53 patients) Patients who underwent various types of laparoscopic surgeries were included in the study. 15 patients (25%) underwent laparoscopic appendectomy [8]. Laparoscopic cholecystectomy was done in 29 patients (48.3%), mostly for calculous cholecystitis [9]. vaginal hysterectomy (LAVH) was done in 2 patients (3.3%) along with salpingoophorectomy. Ovarian cystectomy was done in 2 patients (3.3%). Laparoscopic Splenectomy was done in 1 patient (1.7%) with symptomatic splenomegaly and multiple parenchymal cysts. In all patients, the levels of serum bilirubin, serum AST, serum ALT and serum Alkaline phosphatase were checked preoperatively once and post operatively on day 1 and day 7. The mean level of S.bilirubin preoperatively was 0.79 ± 0.69 mg/dL [10-13]. Postoperatively on day 1 and day 7 the levels were 1.10 ± 0.32 mg/dL and 0.75 ± 0.18 mg/dL respectively. The elevation and depression of intra-abdominal pressure in a short time during the laparoscopic surgery might also be causative as the sudden alteration of intra-abdominal pressure could cause the undulation of portal blood flow, transient liver dysfunction was also found to occur in patients after some general anaesthesia which is associated with anaesthesia induced changes in splanchnic blood flow and oxygen consumption [14]. The "squeeze pressure" effect on the liver can be a mechanism for alterations of serum liver enzymes after laparoscopic cholecystectomy [15-17]. The traction of the gall bladder may free the liver enzymes into the blood stream. But it is not significant here since in our study similar changes are seen in other surgeries like laparoscopic appendectomies and laparoscopic hernia repair too, where liver was not handled at all. We conclude by our study that if the patient's pre-operative liver function was very poor, laparoscopic surgery might not be the optimal choice [18]. An alternative could be gasless laparoscopy which may help avoid hepatic dysfunction. An increase of 5mmHg from 10mmHg to 15mmHg, of the intra-abdominal pressure resulted in a blood flow decrease by 39% to liver and by 60% to peritoneum. Meanwhile it was also found that, splanchnic blood flow decreased along with operative time, in spite of a constant intra-arterial pressure [19].

Conclusion

All types of laparoscopic procedures can cause transient elevation of hepatic enzymes and serum bilirubin for which the major causative factor seems to be CO₂ pneumoperitoneum. This study compared the preoperative and postoperative changes in AST and ALT between open (OC) and laparoscopic cholecystectomy (LC) as well as open (OCR) and

laparoscopic colorectal cancer resection (LCR) in 286 patients. It revealed that a significant rise in AST and ALT was seen 48hrs postop both LC and LRC whereas both open surgeries had near normal values and this was attributed to CO₂ pneumoperitoneum. laparoscopic procedures can cause transient elevation of hepatic enzymes for which CO pneumoperitoneum remains the major causative factor. No apparent clinical changes were seen in the patients undergoing laparoscopic surgery having these transient changes. Hence, as its benefits overcome its limitations, Laparoscopic surgery is soon emerging to be the choice for common surgical conditions in all patients except those with pre-existing liver dysfunction.

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