

A STUDY ON THE EFFECT OF CARBONDIOXIDE AS PNEUMOPERITONEUM ON LIVER FUNCTION IN LAPROSCOPIC CHOLECYSTECTOMY

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Abstract

Background: To study the incidence of alterations in liver function following laparoscopic cholecystectomy in the Indian population. 2.To study the significance of these alterations in patients and the safety of the procedure. **Materials and Methods:** This chapter presents an overview of the study design of LC performed under variable intraperitoneal pressure (12-14mmHg) in patients with cholecystectomy. **Result:** The study will be conducted on 50 patients undergoing LC under variable intraperitoneal pressure (12-14mmHg) at Stanley medical college, chennai. The study will be designed to evaluate the complications of LC especially the changes in liver enzymes. Pre-operative investigations include liver function tests (SGOT, SGPT, alkaline phosphatase, gamma glutamyl transferase, bilirubin (direct), and bilirubin(total)). The subject satisfying inclusion and exclusion criteria will be enrolled in the study. The liver function tests will be further done 24 hrs later and in some patient's liver function test will be repeated to monitor liver function. Adverse events will be noted in all the patients. Finally, the duration of hospital stay will be noted. The patients who develops intra- abdominal complications will be excluded from the study. **Conclusion:** It can be concluded from the findings of the study that usage of co2 as pneumoperitoneum in laparoscopic cholecystectomy has no significant effect on post-operative liver enzymes and variation in insufflation pressure has no effect on enzyme rise significantly.

INTRODUCTION

Operating Room Setup

The operating room setup includes equipment which properly positions the patient. Operative laparoscopic and video equipment and well-coordinated assistant and nursing team are all required. Anesthesiologist should be well versed with the potential problems and complications of laparoscopy. **ESSENTIAL Equipments:** a). Optic Equipments 1. Laparoscope 5mm, 10mm – 100, 300 2.Computed chip video camera 3.Light source 4.Video monitors and video recorder b) Abdomen Access Equipments 1.Veress needle 2.Hasson cannula 3.Gas cylinder (CO2) 4.Trocar and cannulas 5.Insufflators. c).

Laparoscopic Instruments

1.Atraumatic grasping forceps.2, Bipolar coagulation forceps.3.Dissecting forceps – Maryland.4.Scissors. 5.Clip applicators.6. Staplers.7.Endo pouches (or) Sacs.8.Sutures and needles. 9.Needle holder .10. Suction and irrigation system. **LIGHT SOURCE:** High intensity light source (Xenon) is necessary for adequate illumination of peritoneal cavity. The light source is connected to the laparoscope by either fibre

optic cable (or) fluid filled cable. The fibre optic cables consist of an inner core of glass that has a high refractive index which absorbs much of the light input. **VIDEO CAMERA:** Eye piece of laparoscope is attached to video camera and has focus mechanism and zooming power. The resolving power must be 400 lines of resolution per inch and has charge coupled device. **VIDEO MONITOR:** The monitor resolution capability and video camera should match with each other and such monitor is selected. Three chip cameras require expensive monitors with 700 lines of resolution. **LAPAROSCOPES:** Commonly used laparoscopes are rigid instruments that employ the Hopkins rod lens system of optics. It comes in sizes ranging between 3mm to 10mm in diameter and variety of viewing angles. The 0 degree or end/ forward viewing is easy to use and results in least amount of image distortion. Angled scopes (30o, 45o) provide greater versatility by following the operator to look around corners and solid organs but needs experience. Recently, flexible scopes have been developed. **INSUFFLATORS:** Insufflators used to create working space within the abdominal cavity by delivering CO2 via an automatic high flow

pressure – regulator system. CO₂ is currently the agent of choice because of low toxicity, low risk of gas embolism, rapid reabsorption, low cost and ease of use. Ideal insufflator should be able to deliver 8 to 10L/min with a minimum acceptable flow rate of 6L/min. It regulates flow rate, monitors intra-abdominal pressure and stops delivering CO₂ whenever the pressure exceeds predetermined level of 12 to 15mm Hg.

Puncture Instruments

To gain access to the peritoneal cavity 2 types of instruments used,

1. Veress needle
2. Laparoscopic trocar. Hasson cannula is used to create pneumoperitoneum in a “opened” fashion. By using this we may avoid inadvertent injury to the bowel and vessels which may occur occasionally. The basic laparoscopic port consists of an outer hollow sheath or cannula that has a valve to prevent CO₂ escape, side port for insufflation of gas and a portal for instrument access. The commonly used trocars are 5 mm and 10 mm in diameter.

MATERIALS AND METHODS

Method of Collection of Data

(including sampling procedure), if any. The study will be conducted on 50 patients undergoing LC under variable intraperitoneal pressure (12-14mmHg) at Stanley medical college, Chennai. The study will be designed to evaluate the complications of LC especially the changes in liver enzymes. All patients undergoing laparoscopic cholecystectomy will be invited to participate in the study and written informed consent will be taken. All patients will undergo a standard clinical and laboratory evaluation that includes briefly information about age, sex, address and routine investigation including ultra sound abdomen, which are done pre operatively. Pre-operative investigations include liver function tests (SGOT, SGPT, alkaline phosphatase, gamma glutamyl transferase, bilirubin (direct), and bilirubin(total)). The subject satisfying inclusion and exclusion criteria will be enrolled in the study. The liver function tests will be further done 24 hrs later and in some patients liver function test will be repeated to monitor liver function. Adverse events will be noted in all the patients. Finally, the duration of hospital stay will be noted. The patients who develops intra-abdominal complications will be excluded from the study. Type of study: Prospective and Observational Study. Study approval: Prior to commencement of this study - Thesis & Ethical Committee of Stanley Medical College and Hospital, Chennai had approved the thesis protocol. Place of study: Stanley Medical College and Hospital. Period of study: Duration starting from 01 July 2014 to 30 June 2015. Sample size :50 cases with comparative control group of 50 cases. Selection of patients: a) Sampling Method-Purposive. b)Inclusion criteria-

Patients with symptomatic or asymptomatic cholelithiasis or choledocholithiasis, age 20 to 80 yrs. c)Exclusion criteria Any patient with pre-operative abnormality in liver enzymes. Suspected chronic liver diseases, Common bile duct pathology, Conversion to open cholecystectomy, Hematological Disorders, Intra – Operative Complication – CBD injury, Incomplete data.

Study Procedure

Method of sampling was non-random, purposive. After admission short history was taken and physical examination was conducted on each patient admitted in surgery department with features suggestive of extrahepatic biliary lithiasis. Baseline investigations, as routinely required, were done, followed by imaging studies. Patients were then explained about their disease process and the possible line of management. All the necessary information regarding the study was explained to the patients or their valid guardian. Informed written consent was taken from the patients or their guardian willing to participate in the study. Detailed history was taken from the study group to establish proper diagnosis. Thorough physical examination was done in each case. Data collection sheets were filled in by the investigator himself. All of the preoperative factors related to the patient were noted down in the data sheet. After proper evaluation and preparation, patients who required surgical management were taken up for surgery. Strict aseptic precautions were followed during the operation. Meticulous techniques were practiced as far as possible. The operation procedure and related preoperative factors were observed directly and recorded in the data collection sheet instantly. After completing the collection of data it was compiled in a systematic way. Operational definitions: Cholelithiasis: a condition marked by presence of calculi in the gallbladder. Choledocholithiasis: a condition marked by presence of calculi in the common bile duct. Jaundice: Those with S. bilirubin >1.2 mg/ l were recorded as jaundiced. Diabetes: Those known as diabetic from history and those with RBS more than 11 mmol/ l were included as diabetic. ERCP: (endoscopic retrograde cholangiopancreatography) is a procedure used to diagnose and treat diseases of the gallbladder, biliary system, pancreas, and liver.

RESULTS

This prospective and observational study was carried out to determine the effect of CO₂ on liver function test was studied. Fifty patients fulfilling the inclusion criteria from Surgery department of Stanley Medical College and Hospital during the period of 1 July 2014 to 30 June 2015. All cases were evaluated clinically. Only essential investigations necessary for diagnosis and preoperative assessment were carried out before operations. All patients underwent post op LFT in addition. The patients of both sexes and different ages were included in the study. The results obtained are

as follows. Types of operations: were recorded during each operation.

Table 1: Comparison for Total Bilirubin Preop and Postop

	CO2 Pressure used	Mean	Std. Deviation	N
	GROUP 1	1.150	.4590	16
	GROUP 2	1.171	.5977	17
PRE_TB				
	GROUP 3	1.153	.4598	17
	Total	1.158	.5002	50
	GROUP 1	1.006	.3678	16
	GROUP 2	1.106	.4175	17
POST_TB				
	GROUP 3	1.082	.3909	17
	Total	1.066	.3874	50

Table 2: Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	123.406	1	123.406	379.974	0	0.89
CO2 Pressure used	0.061	2	0.031	0.094	0.91	0.004
Error	15.264	47	0.325			

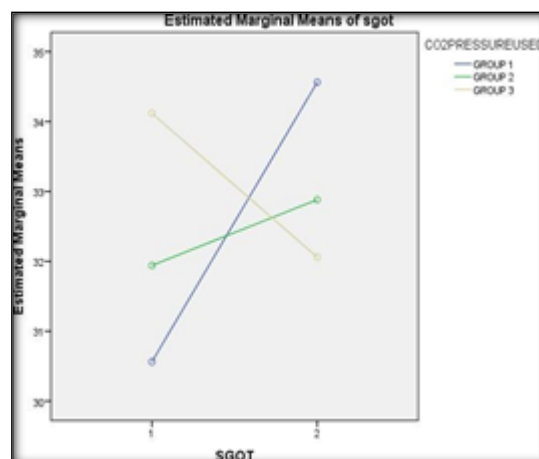
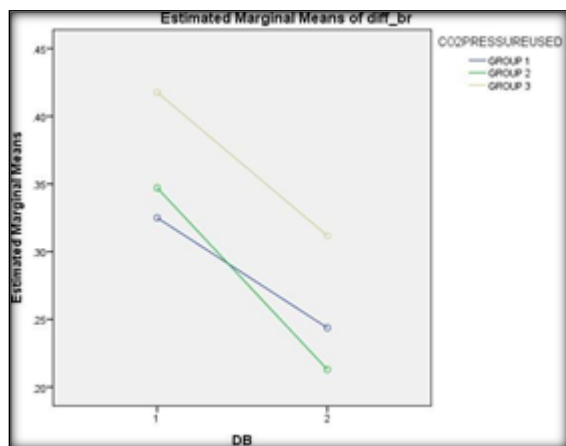
Effect of Co2 pneumoperitoneum was studied and preop and post of direct bilirubin doesn't show significant rise [P is 0.2939].

Table 3: Comparison between Co2 Pressure and Total Bilirubin

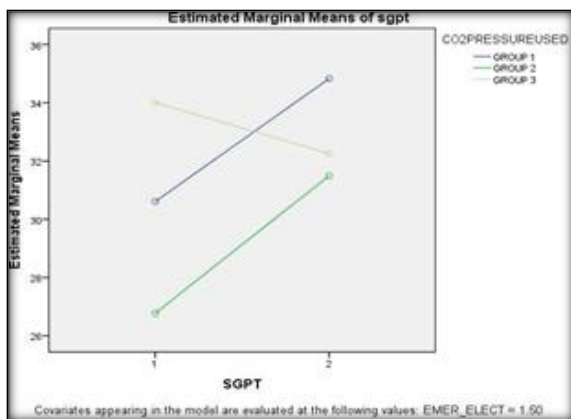
	CO2Pressure used	Mean	Std. Deviation	N
	GROUP 1	0.325	0.1693	16
	GROUP 2	0.347	0.2939	17
PRE_DB				
	GROUP 3	0.418	0.2186	17
	Total	0.364	0.2328	50
	GROUP 1	0.244	0.159	16
	GROUP 2	0.213	0.11	17
POST_DB				
	GROUP 3	0.312	0.19	17
	Total	0.256	0.1589	50

Variable CO2 pneumoperitoneum pressure doesn't have any effect over the rise in serum direct bilirubin levels {P is 0.267}.

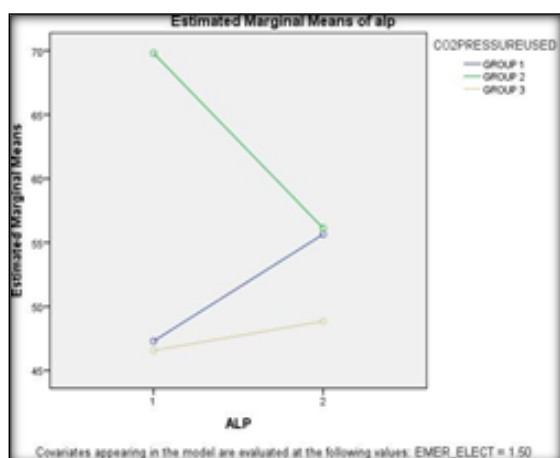
Graphical Rep of Serum Bilirubin



SGOT, SGPT and ALP dosent show any significant rise in the values postoperatively estimated marginal means of SGOT



Estimated Marginal Means of ALP



DISCUSSION

This prospective, observational and comparative study was conducted among 50 purposively selected patients with evidence of cholelithiasis in department of General Surgery, Stanley Medical College and Hospital. The study was carried out with a view to determine the effect of co2 as pneumoperitoneum on liver functions during laproscopic cholecystectomy in view of determining its importance as it have no such role in raising the liver enzymes. Age of 50 patients ranged from 28-77 years. Most of the patients (19,38%) were in between 25-36 years; with mean age 30years and standard deviation 1.83 years. 20% of the patients were males while 80% of the patients were females. The male to female ratio was ~ 1 : 4.females are predominating the study.The study is based on additive ANOVA model. The effect of Co2 on individual liver enzymes were studied. The surgery is classified based on emergency or elective. Based on duration of study classified as group 1<30 min, group 2,30-90 min, group 3,90-135 min, group 4,>135 min. Preoperative T.B. shows mean value of 1.171 and standard deviation of 0.5977 and post op T.B. mean value of 1.106 and SD of 0.4175. Preop D.B was mean 0.347 with SD 0.29,post op D.B. was 0.213 and SD of 0.11.with p value of 0.77. Pre operative SGOT with mean 31.94 and SD 13.53 and post operative SGOT with mean 32.88 and SD 15.4 with p value

0.197. Preoperative ALP was mean with SD is 66.24 and 83.14 and post-operative value 53.82 and SD 43.411 and p value was 0.125.

Limitations of the Study

As this study has been carried out over a limited period of time with a limited number of patients and there was lack of financial and infrastructural support, it could not have been large enough to be of reasonable precision. All the facts and figures mentioned here may considerably vary from those of large series covering wide range of time, but still then, as the cases of this study were collected from a tertiary level hospital in our country.

CONCLUSION

This prospective observational type of study was conducted in department of General Surgery, Stanley Medical College and Hospital, Chennai, from 1 July 2014 to 30 June 2015. It can be concluded from the findings of the study that usage of co2 as pneumoperitoneum in laproscopic cholecystectomy has no significant effect on post operative liver enzymes. It can be concluded that variation in insufflation pressure has no effect on enzyme rise significantly. It can be observed that duration of surgery with co2 pneumoperitoneum has no effect on postoperative LFT level. Thus co2 in safe pneumoperitoneum can be safely used in laproscopic surgeries.

Recommendations

On the basis of the findings of the study, the following recommendations can be made:

1. Co2 can be recommended in all laproscopic surgeries as insufflator.
2. Further research is necessary in large scale for guidance regarding management.

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