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COMPARATIVE STUDY OF LOW PRESSURE CHOLECYSTECTOMY COMORBID CONDITIONS IN TERTIARY CARE CENTER OF INDIA

Surgery

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ABSTRACT

Background: Use of Pnemoperitioneum was first proposed by **Olte Goetze** of Germany in 1981. Flow rates of insufflator to maintain an adequate pneumoperitoneum is about 6-8 lit/min not to let this pressure rise to more than 12 to 15 mm Hg. Low pressure pneumoperitoneum is feasible for laparoscopic cholecystectomy and minimizes the adverse hemodynamic effect.

Material And Method: All these patients undergone, a full clinical evaluation (detailed history and examination). A] Low-pressure capnoperitoneum laparoscopic cholecystectomy performed in 35 patients with no comorbid condition-referred as Control. B] Low-pressure capnoperitoneum laparoscopic cholecystectomy performed in 37 patients with comorbid condition-referred as study group. Intraoperative and postoperative assessment of complications done.

Observation: Mean blood loss in study group (63.02±14.46) was significantly higher than in control group (49.08±15.26), in study group (61.06±19.83 minutes) was significantly higher than in control group (46.06±19.83 minutes). Conversion rate in control group was 5.7% (2/35), 8.1% (3/37) to open and 2.7% to Standard pressure capnoperitoneum Laparoscopic cholecystectomy in study group. Occurrence of complication during intraoperative period on our series (5.4%). Postoperative nausea and vomiting occurred in 7 (21.2%) and 4 (12.1%) patients of study groups. In study group was 20.60±8.52 hours and in control group it was 24.49±10.03 hours. Quality of life on day 5 was (80.2±4.3) in study groups, (84±4.4) in control group. Postoperative complication rate compares favorably to with postoperative complication rate of 196.3%.

Conclusion: Low-pressure capnoperitoneum laparoscopic cholecystectomy is a safe treatment for cholecystitis in obese, elderly, diabetics, cardiac disease, lung disease

KEYWORDS

Laparoscopic Cholecystectomy, Low Pressure Cholecystectomy, Comorbid Cholecystectomy, Complications In Cholecystectomy.

INTRODUCTION

Cholecystectomy is the commonest operation of the biliary tract & the second most common operative procedure formed today [1] German surgeon ***Carl Johann August Langenbuch*** is credited with having pioneered the Concept & execution of gall bladder extirpation [2]. He developed the technique of Cholecystectomy through Cadaveric dissection and on July 15, 1882 he successfully removed gall bladder of a 43 year old man who was suffering from disease for 16 years [3]. In September 1992 a NIH Consensus conference held in Bethesda concluded that Laparoscopic Cholecystectomy was treatment of choice for gall bladder Lithiais.[4] . Flow rates of insufflator to maintain an adequate pneumoperitoneum is about 6-8 lit/min not to let this pressure rise to more than 12 to 15 mm Hg. Low pressure pneumoperitoneum is feasible for laparoscopic cholecystectomy and minimizes the adverse hemodynamic effect.

BENEFIT OF LOW PRESSIRE; ATOPM TECHNIQUE

- Minimizes adverse hemodynamic effects of peritoneal insufflation.
- Decrease post-operative shoulder tip pain.
- Better quality of life in early postoperative period.
- Pulmonary function compromise is to lesser extent.

MATERIAL AND METHODS

This prospective study was conducted on 72 patients admitted to Swaroop Rani Nehru Hospital, Allahabad from 1st October, 2018 to 30th September 2019 who were having Gall bladder disease with or without comorbid condition planned for surgery. Who after informed consent, opted for Low-pressure capnoperitoneum laparoscopic cholecystectomy (I,e at 7mm Hg).

All these patients undergone, a full clinical evaluation (detailed history and examination) and following investigations done in patients depending upon comorbid condition.

Preoperative Assessment:

(a) Hemogram
(b) Renal function test
(c) Blood sugar
(d) Liver function test
(e) Pulmonary function test
(f) Electro-Cardiography
(g) Radiological:
X-ray chest
Ultrasound

Patients were divided in two groups.

A] Low-pressure capnoperitoneum laparoscopic cholecystectomy performed in 35 patients with no comorbid condition-referred as Control.

B] Low-pressure capnoperitoneum laparoscopic cholecystectomy performed in 37 patients with comorbid condition-referred as study group.

Comorbid Conditions Include Were

(a) Aged: Age ≥ 65
(b) Obesity: Body mass index≥30 kg/m^2
(c)Lung diseases: Reduced FEV_1/FVC ratio (<75%).**(d)Cardiac**

disease:
ECG : ST segment elevation or depression, evolving q waves, symmetric inversion of T waves.

(e)Hypertension
(f)Diabetes (Type 2)
(g)Liver disease

Anesthesia: Diazepam and Ranitidine were given night before the operation. Glycopyrolate were given 45 minutes before induction of general anesthesia. General anesthesia with cuffed endotracheal tube was used along with controlled ventilation.

Operative Technique: Low-pressure capnoperitoneum laparoscopic cholecystectomy technique was used for all patients. A pneumoperitoneum was established by percutaneous method. After the abdomen had been distended to a maximum pressure of 12 to 15 mm Hg, the insufflation needle was replaced with a 10 diameter laparoscopic cannula. Four ports were used, after the placement of all trocars, the

working pressure was reduced from 12-15 mm Hg to 7mm Hg.

Now the patient was put in reverse trendelenburg position with left tilt. Anatomy of calot's triangle was visualized. Cystic artery and cystic duct were dissected from each other, clipped separately and cut. Gall bladder was dissected from its bed by electrosurgical hook with electrosurgical attachment. In all cases, gall bladder was extracted through 10 mm epigastric port with the help of extractor. All ports were removed after complete exist of CO_2 and port sites were closed.

Intra Operative Assessments:
1. Blood loss
2. Duration of Operation
3. Intra Operative complication
Spillage of bile/stone
Bleeding
CBD injury
Bowel injury
Hepatic injury
Vascular injury

4. Conversion:
Standard Pressure
Open Cholecystectomy

Post-Operative Assessment
1. Pine (Visual Analogue Scale), including shoulder trip pain.
2. Post-operative Nausea & vomiting.
3. Time to resume diet.
4. Post-operative complications.
a. Fever
b. Urinary retention
c. Wound infection
d. Respiratory tract infection
e. Urinary tract infection
f. Abdominal collection
g. prolonged bleeding from drain
h. Omental herniation
i. Haemorrhage from trocar site
j. Cystic duct leak
k. Upper gastrointestinal bleed
l. Hepatic Encephalopathy
m. Ascitis Aggravation
n. Septicemia
o. Myocardial Infarction
5. Quality of life on 5th postoperative day (Physical domain)
6. Postoperative hospital stay.
7. Mortality.

The Independent Variable:
included age, sex, height, weight, body mass index and clinical diagnosis of patient.

The Dependent Variables: included the following

1.Operative Parameters: Pain (Visual analogue scale), including shoulder tip pain, post-operative nausea 7 vomiting, time to resume diet, postoperative complications and mortality.

1. **Age:** Age≥65 year were considered aged, which itself was considered as an comorbid condition.
2. **Sex**
3. **Height in cms.**
4. **Weight in kg.**

5. **Body Mass Index:≥30** kg/m^2 were considered obese, which itself was considered as an comorbid condition.

6. **Blood loss**
7. **Intraoperative complications:** Bleeding.
8. **Duration of surgery**
9. **Conversion to open/standard pressure**

10. **Postoperative pain:** Evaluation done 4, 8, 12, 24, 48, and hours postoperatively.

11. **Postoperative nausea and vomiting:** When occurred within 24 hours of operation.

12. **Time to resume diet:** When bowel sound returned.

13. **Quality of life on day 5:** It was assessed by global assessment measuring a single attribute.

14. **Post-operative hospital stay**
15. **Mortality:** Death within 30 days

STATISTICS:
All continuous variables were expressed as the mean ± SD and compared using student's t-test. Proportions were compared using the chi-square test with Yate's correction. Statistical analysis was carried out by SPSS/PC+ (SPSS, CHICAGO, IL, USA) on an IBM-compatible computer; and $p<0.05$ was considered statistically significant.

Inclusion Criteria
1. patients who can tolerate general anaesthesia
2. patients with no medical comorbid conditions- septicemia, DM, hypertension, TB
3. patients who can tolerate capnoperitoneum.
4. patients giving consent for surgery.

Exclusion Criteria
1. serious life threatening illness
2. dropouts.

OBSERVATIONS AND RESULTS

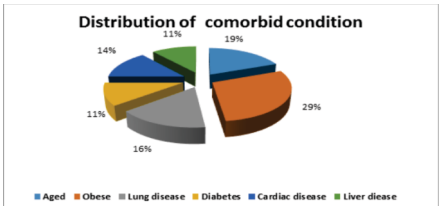

Fig-1: shows comorbid condition with number and percentage of patients having it.

Aged patients 7(19%), obese patients 11(29%), patients with lung disease are 6(16%), diabetic patients 4(11%), cardiac disease patients are 5(14%), liver disease patients 4(11%)

Table-1: Age Distribution In Groups

Age group (years)	Control (N= 35)		Study group (N =37)	
	N	(%)	N	(%)
20-29	5	14.28	4	10.8
30-39	14	40	10	27.6
40-49	10	28.57	9	22.9
50-59	6	17.15	6	16.6
60-64	0	0	1	2.8
65	0	0	7	19.3
Total	35	100	37	100

Table-1 is showing age distribtion in 72 (37 Study groups and 35 Controls) patients included in study.

In present study mean age in Control was 38.85±9.57 years, age in this group ranges from 20-58 years and maximum patients were in age group 30-39 years (14). Mean age in study group was 46.94 ± 13.9 years ranges from 23-78 years and maximum patients were in age group 30-39 year (10).

Sex Distribution
Table-2: Sex Distribution In Groups

Sex	Control (N=35)		Study group (N=370)	
	N	(%)	N	(%)
Male	**6**	**17.14**	**7**	**18.92**
Female	**29**	**82.86**	**30**	**81.8**

Table-2 is showing sex distribution in 72 (37 Study groups and 35 Controls) patients included in study.

Majority of patients in both groups are females. Chi-square test was used for statistical analysis, x^2 value is 0.04 with degree of freedom 1 and P value 0.84. P value is non-significant means Study groups and controls are comparable for sex.

Height Distribution

FIG-2: is showing height distribution kin 72 (35 Control and 37 Study groups) patients include in study.

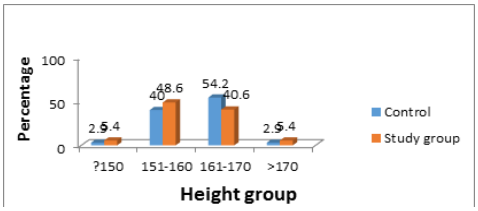

Fig 2- Height

In study mean height in control group was 161.5±4.85 cm, height in this group ranges from 149-171 cm and maximum patients have height in between 151 and 160-170 cm. Mean height in Study group was 160.± 5.60 cm, height in this group ranges from 148-175 cm and maximum patients have height in between 151 and 160 cm.

Chi-square test was used for statistical analysis, x^2 value is 1.58 with degree of freedom 3 and p value 0.66. P value is non-significant means Study groups and Controls are comparable for height.

Weight distribution

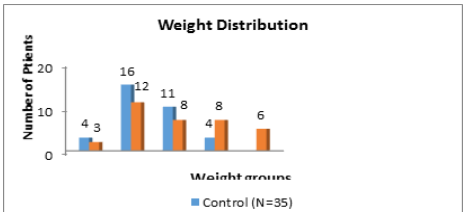

FIG-3

Fig -3: is showing weight distribution in 72 (35 control and 28 study group) patients include in study.

Mean weight in control group was 59.02± 8.77 kg and weight in this group ranges from 45 kg to 74 kg, maximum patients have weight in between (51-60) kg. mean weight in study group was 67.35 ± 12.67 kg and weight in this group ranges from 47 kg to 97 kg, maximum patients have weight in between 51 and 60 kg.

BMI Distribution

Table-3: is Showing body mass index distribution in 72 (35 control and 37 Study groups) patients included in study.

Table 3: BMI

BMI (kg/m^2)	Control (N=35)		Study group (N=370	
	N	(%)	N	(%)
≤ 25	23	76.92	20	55.2
25-29.9	12	23.08	6	16.6
>29.9	0	0	11	28.2
Range	13.3-26.6		81.1-33.3	
Mean BMI	23.50		25.40	
Standard Deviation ±	± 3.07		± 4.63	

Mean body mass index in control group was 23.50± 3.07 kg/m^2, body mass index in this group ranges from 18.1-33.3 kg/m^2, and maximum patients have body mass below 25 kg/m^2.

Mean Blood Loss

Table-4: is showing mean blood loss (ml) in 66 (33 control and 33 Study) patients included in study.

Mean blood loss in control groups was 49.08 ± 15.26 mean blood loss in this group ranges from 30-110 ml. Mean blood loss in study group was 63.02±14.46 ml, mean blood loss in this group ranges from 40.-110 ml.

Student 't' test was used for statistical analyses t value was 3.80 with degree of freedom 64 and p value 0.0001, means that the blood loss is significantly higher in study group. Mean blood loss is significantly higher in aged (63.33±16.32ml), obese (70.00±17.70ml), diabetics (60.00±8.16ml). (P values=0.04, 0.005, 0.03, 0.01, and 0.01).

In patients with lung disease (51.66±11.69ml) mean blood loss is not significantly higher (p value =0.320).

Table-4: Mean Blood Loss

Complication	Study group (N=33)							Control (n=33)
	Aged	obese	Diabetes	Lung Disease	Cardiac disease	Liver disease	Total	
Perforation of gallbladder (spillage of bile)	0	1	0	0	0	0	1	1
Bleeding	0	0	1	0	0	0	1	0
Stone left in abdomen	0	0	0	0	0	0	0	1
Hepatic injury	0	0	0	0	0	0	0	0
CBD injury	0	0	0	0	0	0	0	0
Vascular injury	0	0	0	0	0	0	0	0
Bowel injury	0	0	0	0	0	0	0	0
Impaired ventilation	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	2	2

Table 5: Mean operative time: (Excluding converted patients)

Control(N=33)		Study group (N=33)						
		Aged	obese	Diabetes	Lung Disease	Cardiac disease	Liver disease	Total
Range	25-100	40-80	40-100	40-90	35-60	50-70	50-70	35-100
Mean operative time (minute)	46.06	65.00	69.37	66.25	46.66	57.00	60.00	61.06
Standard deviation ±	± 19.83	±17.60	±20.07	±20.56	±8.75	±14.83	±34.64	±19.83
Df		7	9	3	13	6	3	62
t value		2.44	3.04	1.89	0.13	1.51	0.79	3.34
p value		0.02	0.006	0.077	0.44	0.09	0.24	0.0006

MEAN OPERATIVE TIME

Table-5: is showing mean operative time in 66 (33 Control and 33 Study group) patients included in study.

Mean operative time Control group was 46.06±19.83 minutes, ranges form 25-100 minutes. Mean operative time in Study group was 61.06.±19.83 minutes, ranges from 35-100 minutes.

Student 't test was used for statistical analysis t value was 3.34 with degree of freedom 62 and p value 0.0006, means that the mean operative time is significantly higher in Study group.

Mean operative time was significantly higher in the aged (65.0077±17.60 minutes) and obese (69.37±20.07 minutes). (P value =0.02, and 0.006). It was not significantly different in diabetes (66.25±20.56 minutes), cardiac patients (57.00±14.83 minutes), lungs disease (46.66±8.75 minutes) and in patients with liver disease (60.00±34.64 minutes). (P value=0.077, 0.09, 0.44, 0.24 respectively),.

There were two conversions in Control group, the operating time these were 100 minutes and 80 minutes. In Study group one was converted to standard pressure capnoperitoneum Laparoscopic cholecystectomy for which operating time was 80 minutes and two were converted to open cholecystectomy, operating time in these were 100 minutes and 120 minutes.

Intraoperative Complications

Two intraoperative complications occurred in one patient in control group (6%). They were perforation of gallbladder (1) and Stone left in abdomen (1). These were managed by saline irrigation.

Two intraoperative complications occurred in two patients in Study group, group (6%). They were perforation of gallbladder (1), Bleeding (1).

The difference in occurrence of intraoperative complications are not statistically significant (p value=1)

Perforation of gallbladder, Stone left in abdomen, and bleeding were common complications in both groups.

In Study group one complication was observed in obese patient (12.05%). The complication was perforation of gallbladder. One complication occurred in diabetic group (25%). The complication was bleeding. The difference in occurrence of intraoperative complications were not statistically significant in these groups as compared to Control group (P value>0.05).

No intraoperative complication occurred in aged, lung disease, cardiac and liver disease group.

Hepatic injury, CBD injury, vascular injury, Bowel injury, and impaired ventilation were not observed in any patient in either group.

Table 6: Conservation Rate

Control (n=33)		Study group (N=33)					
		Aged	obese	Diabetes	Lung Disease	Cardiac disease	Liver disease
Conversion into open cholecystectomy	2	1	2	0	0	0	0
Conversion into SPL cholecystectomy	0	0	1	0	0	0	0

Table-6: is showing conversion in 72 (35 Control and 37 Study groups) patients included in study.

Conversion rate in control group is 5.7% (2-35). While it is 8.1% (3/37) to open and 2.7% to Standard pressure capnoperitoneum Laparoscopic cholecystectomy in Study group (P value=0.42).

Cause of conversion into open cholecystectomy in Control group was bleeding (1) and dense adhesions (1). In Study group cause were cardiac arrest (1), adhesions (2).

Cause of conversion into Standard pressure capnoperitoneum, Laparoscopic cholecystectomy was adhesions (1).

Most conversions in Study group were in obese patients.

Table-7: Postoperative Nausea And Vomiting In Group (number Of Patients)

Control (n=33)		Study group (N=33)						
		Aged	obese	Diabetes	Lung Disease	Cardiac disease	Liver disease	Total
Range	8-44	8-44	8-44	8-44	8-30	22-30	22-30	8-44
Mean time to resume diet (hours)	20.60	29.66	24.25	24.0	20.99	23.68	24.6	24.49
Standard deviation ±	±8.52	±13.70	±12.11	±14.87	±7.12	±3.53	±4.00	±10.03
Df		6	9	3	8	13	7	62
t value		1.56	0.80	0.44	0.11	1.42	1.36	1.69
P value		0.08	0.22	0.34	0.45	0.08	0.10	0.05

Chi-square test: p value>0.05

Number	2	3	1	0	0	1	7	7
Vomiting	1	2	0	0	1	1	5	4

Table-7: shows Postoperative nausea and vomiting in 66 (33 Control and 33 Study groups) patients included in study.

Postoperative nausea and vomiting occurred in 7(21.2%) and 4 (12.15) patients of control group, 7(21.2%) and 5(15.1%) patients of study group, respectively (P value>0.05). Postoperative nausea and vomiting occurred in 2(28.6%) and 1(25%) and 0 (%) patients in diabetic group, 0(05) and 1(250 patients in cardiac disease group, and 1(25%) and 1(25%) patients in liver disease group.

No patients in lung disease group developed Postoperative nausea and vomiting.

Table-8: is showing the time taken to resume diet in 66 (33 Control and 33 Study groups) Patients included in study.

Mean time to resume diet in control group is 20. 60±8.52 hours, time to resume diet in this group ranges form 8-44 hours. Mean time to resume diet in Study group is 24.49±10.03 hours; time to resume diet in this group ranges form 8-44 hours.

Student 't test was used for statistical analysis; to value was 1.69 with degree if freedom 62 and p value 0.05, means that the mean time to resume diet is not significantly higher in Study group.

There is no significant difference in mean time to resume diet in aged (29.00±14.87 hours), obese (24.25±12.11 hours), diabetics (24.00±14.87 hours), cardiac (23.68±4.00 hours). (P value=0.08, 0.22, 0.34, 0.08, 0.45, and 0.10 respectively)

Table-8: Mean Time To Resume Diet In Groups

	Study group (N=33)							Control (N=33)
	Aged	Obese	Diabetes	Lung disease	Cardiac disease	Liver disease	Total	

Table-9: Post-operative Complication In Groups

Complication	Study group (N=33)							Control (n=33)
	Aged	obese	Diabetes	Lung Disease	Cardiac disease	Liver disease	Total	
Fever	0	1	0	0	0	0	0	1
Urinary retention	0	0	0	0	0	0	0	0
wound infection	0	1	1	0	0	0	2	1
Respiratory tract infection	1	0	0	0	0	0	1	1
UTI	0	0	0	0	0	0	0	0
Abdominal collection	0	0	0	0	0	0	0	0
Prolonged bleeding from drain	0	0	0	0	0	0	0	0
Omental herniation	0	0	0	0	0	0	0	0
Hemorrhage through trocar site	0	0	0	0	0	0	0	0
Cystic duct leak	0	0	0	0	0	0	0	0
Upper gastrointestinal bleeding	0	0	0	0	0	0	0	0
Hepatic encephalopathy	0	0	0	0	0	0	0	0
Ascitis aggravation	0	0	0	0	0	0	0	0
Total1	1	1	1	0	0	0	3	3

Table-9: is showing postoperative complications in 66 (33 control and 33 study groups) patients included in study.

Three postoperative complications occurred in two patients in control group (9%. They were fever (1), wound infection (1), and respiratory tract managed conservatively by proper dressing and antibiotics. Patient was discharged on fifth postoperative day on oral antibiotics. One Patient developed respiratory tract infection which was managed conservatively by chest physiotherapy and antibiotics. Patient was discharged on fourth postoperative day on oral antibiotic.

One (14.35) postoperative complication occurred in aged patient. It is not different statistically form Control group (P value=0.64). The complication was respiratory tract infection. It was managed conservatively by chest physiotherapy and antibiotics. Patient was discharged on fourth postoperative day on oral antibiotics.

One (12.5%) postoperative complication occurred in obese patient. It is not different statistically from control group (P value=0.77). The complication was wound infection. It was managed conservatively by proper dressing and antibiotics. Patient was discharged on fifth postoperative day on oral antibiotics.

One (25%) postoperative complication occurred in diabetic patient. It is not different statistically from control group (P value=0.33). The complication was wound infection. It was managed conservatively by proper dressing, antibiotics and glycemic Control. Patient responded well and was discharged on sixth postoperative day on oral antibiotics. Wound infection and respiratory tract infection were common complications in both groups.

No complication occurred in patients of lung disease, cardiac disease, and liver disease.

Urinary tract infection, omental herniation, cystic duct leak, upper gastrointestinal bleeding, hepatic encephalopathy, and ascitis aggravation was not observed in any patient.

Table-10: Mean Hospital Stay In Groups (excluding Converted Patients)

Control (n=33)		Study group (N=33)						
		Aged	obese	Diabetes	Lung Disease	Cardiac disease	Liver disease	Total
Range	1-4	2-4	1-4	2-5	1-4	1-4	2-4	1-5
Mean hospital stay (days)	2.36	3.16	2.62	3.12	2.43	2.75	2.96	2.66
Standard deviation ±	0.65±	±0.75	±1.06	±1.40	±1.24	±1.2	±0.95	1.10
Df		5	8	3	5	4	3	52
t value		3.05	2.01	1.13	0.217	1.39	1.20	3.38
P value		0.01	0.26	0.16	0.41	0.27	0.16	0.09

Table-10: is showing mean hospital stay in 66 (33 control and 33 Study groups) patients include in study.

Mean hospital stay in Control group was 2.36±8.52 days, hospital stay in this group ranges from 1-4 days. Mean hospital stay in Study group was 2.66±1.10 days, hospital stay in this group ranges form 1-5 days.

Student 't test was used for statistical analyses t value was 3.38 with degree of freedom 52 and p value 0.09, means that the mean hospital stay is not significantly different in Study group.

There were no significant difference in mean hospital stay in obese (2.62±12.11), diabetics (3.12±1.40), Cardiac (2.75±1.2), lung disease (2.43±1.24) and in patients with liver disease (2.96±0.95) (P value = 0.26, 0.16, 0.27, 0.41 and 0.16 respectively).

There was significant difference in mean hospital stay in aged (P value=0.01) and control group.

NO MORTALITY WAS OBSERVED IN ANY GROUP.

DISCUSSION

Comorbid conditions studied were aged (≥65), obesity, diabetes, cardiac disease, lung disease, liver disease.

Factors studied were blood loss, duration of operation, intra operative complications, conversion, postoperative pain (Visual Analogue Scale) including shoulder tip pain, post-operative nausea & vomiting, time to resume diet, post hospital stay, and mortality.

1. Mean Blood Loss:

In the present study, mean blood loss in study group (63.02±14.46) was significantly higher than in control group (49.08±15.26) (P value=0.001). Mean blood loss in aged (63.33 ml), obese (70.00±17.70 ml), diabetic group (60.00±8.16 ml), cardiac disease group (59.96±7.07 ml) and liver disease group. (72.50±12.58ml) was significantly higher than in control group. (P value=0.043, 0.005, 0.03 and 0.01 respectively). No significant difference was found in mean blood loss in lung disease group (51.66±11.69 ml) and control group (0.320

Slightly greater blood loss in aged, obese and diabetics due to complicated gall stone disease, difficulty in resolving the anatomy in these patients and adhesions. While in liver disease group, large venous collaterals is the liver hilum and deranged coagulation profile. In patients with cardiac disease the cause of greater blood loss could be due to fluctuations in blood pressure during surgery.

In Previous study of **WU Ji, Ling-Tang Li et-al (2005)**[5] mean blood loss in patients with liver was 75±15.5 ml. This is similar to the result in our study.

2. Mean Operative Time:

In our series mean operative time, in study group (61.06±19.83 minutes) was significantly higher than in control group (46.06±19.83 minutes) (P value=0.0006)

In current study, the mean operative time in patients without comorbid condition was lower than previous reported series **of D Divides et al**[6] **(78 minute) (1999), SPL Dexter et al**[7] **(103.5 minute) (1999), Barczynsk et al**[8] **(55.7 minute) (2003) and S. Hasukie et at** [9] **(104 minute)(2005).**

a. Aged:

In our series, mean operative time for aged group (65±17.60 minutes) higher than control group. (p value=0.02).Godacz[34](54 and 138 mins), Tangle et al.

b. Obese:

In ourstudy mean operative time of Laparoscopic cholecystectomy for obese group (69.37±20.07 minutes) was significantly higher than control group (P value=0.006). D.Collet et.al[16] (89±32 mins) (1992), B. Ammori et.al[11] (80 mins) (2001). Mean Operative time in one obese patient in whom procedure was converted to Standard pressure capnoperitoneum Laparoscopic cholecystectomy was 80 mins.

c. Lung disease:

In our series mean operative time for lung disease group (46.66±8.75 mins) was different from control group (P value=0.009). Mean operative time of Laparoscopic cholecystectomy in lungs disease group was quite similar to the results of P0ursani et. al.[12] (1998) (50 minutes).

In our study, no significant difference was found in mean operative time of Laparoscopic cholecystectomy in liver disease group and control group**,** diabetic group (66.25±20.56 mins), and cardiac disease group (57.00±14.83 minutes) were not statistically different from control group (p value=0.24,p value=0.077 and 0.09 respectively).

3. Conversion:

In present study conversion rate in control group was 5.7% (2/35) while it was 8.1% (3/37) to open and 2.7% to Standard pressure capnoperitoneum Laparoscopic cholecystectomy in study group. (P value=0.42)

Causes of conversion into open cholecystectomy in control group were bleeding (1) and dense adhesion (1).

In study group causes were cardiac arrest (1), dense adhesions (2). Cause conversion into Standard pressure Capnoperitoneum Laparoscopic cholecystectomy was dense adhesions (1).

a. Aged:

In our series one conversion into open cholecystectomy occurred in aged patients, this was due to dense adhesions in Callot's triangle.

The conversion rate in our study of elderly patients was 14.3% which

was higher than that of control group (P value=0.04).fried et. al[13] (10.4%0 (1994), Milheriro et.al[14] (15%)(1996).

Most conversions in study group were in obese patients. Two into open cholecystectomy and one into standard pressure capnoperitoneum, Laparoscopic cholecystectomy. The conversion rate in study is higher than conversion rate of 4-10% in previous series of Bruce D et al[15] ,10.4 (1999) D. collet et. al[16] (3.9) (1992), and B ammori et al[11] (4.3) (2001).

In our series of lung disease, we did not have to convert to open cholecystectomy in any patient of COPD, this was similar to results of previous studies of Pursani Kg et.al[12] (1999), and HEICH CH et.al(2003)[19], liver disease. In previous studies of Poggio JL et.al (2000) (12%), JiW, LIL t et.al[18] (2004) (5.3%), WU JI it.al[5] (2005) (5.3%) it was quite higher than our series No conversion occurred in diabetic group, and cardiac disease group in our series.

9. Intraoperative Complication:
The occurrence of complication during intraoperative period on our series is similar to series of Barczynski et al[8] (5.4%) (2003,) and compares favorably to with intraoperative complication rate of 37% observed recently in the large series in the large series of axel ros et al[17] (2001). no intraoperative complication occurred in aged group. 1.43% ,L Brunt et al[19] (2006). In obese group (12.5%). 4-9% in large series of Bruce D et al[15] (1999) and B Ammori et al[11] (2001), one complication occurred in Diabetic group i.e. bleeding, (p value=>0.05). Lung disease and cardiac disease no intraoperative complication occurred, Pursani KG. et.al[12] (1998) and Heich Ch et. al[19] (2003).

Postoperative Pain:
In our series, no statistically significant difference was observed in postoperative pain score of study and control group at a 4,8,12,24,48, and 144 hours. Barczynski et.at[8] (2003).

Shoulder Tip Pain:
18.1% (6 in 33) in control group and 12.2% (4 in 33) in study group. (P value=0.49).The present prospective trial has same results (P value=0.78) in terms of Postoperative shoulder tip pain as previously observed by Braczynski et al. (2003).

Post-operative Nausea And Vomiting:
Postoperative nausea and vomiting occurred in 7 (21.2%) and 4 (12.1%) patients of study groups, respectively (P value>0.05). 2 (28.6%) and 1 (14.3%) patients in aged group, 3 (37.5%) and 2(25.0%) patients in obese group, 1 (25%) and 0 (0%) patients in diabetic group, 0(0%) and 1(20%) patients in cardiac disease group and 1 (25%) and 1 (25%) patients in liver disease group. No patients in lung disease group. D. Davides et. at[6] (33%&16%) (1999) and Barczynski et al.[8] (27.025&16.21%) (2003).

MEAN TIME TO RESUME DIET:
In study group was 20.60±8.52 hours and in control group it was 24.49±10.03 hours. In aged (29.66±13.70 hours), in obese (24.25±12.11 hours), diabetic group (24.00±14.87 hours), lung disease group (20.99±7.12 hours), cardiac disease group (23.68±3.53 hours) and in liver disease group was (24.60±4.00 hours). (P value=0.08,0.22, 0.34, 0.45, 0.08, 0.010 respectively) i.e. insignificant.

In WU Ji, Ling-Tang Li et-at[5] (2005) was 18.3±6 hours. In our study liver disease (20.5±4.14 hours) using low pressure Capnoperitoneum.

Quality Of Life On Day 5: (physical Domain)
In present study, quality of life on day 5 was (80.2±4.3) in study groups and it was (84±4.4) in control groups. The difference between the two groups are statistically significant (p value=0.0008).

Quality of life on day 5 in aged (78.3±7.6), in obese (79.6±6.8), diabetics (80.5±6.5), lungs disease (84.3±5.0), cardiac disease (80.4±4.5) and in liver disease was (81.9±3.57). The difference in these groups and control groups is not statistically significant. (p value=0.057, 0.05, 0.13, 0.11, 0.06 and 0.14 respectively).

Postoperative Complication:
In our series, postoperative complication rate compares favorably to with postoperative complication rate of 196.3% observed recently in large series of Axel ros et al[17] (2001).

Aged:
In our series the postoperative complication rate was 14.3%, which is comparable to postoperative complication rate of 7-8% in large series of Fried et.al[13] (11.6%) (1994), Milheiro et al[14] (1996), Lujan et. al[20] (13.5%) (1997), P. Pessaux et.al[21] (13.7%) (2000), L.M. Brunt et. al[22] (18.3%) (2001)

Obese:
In our series postoperative complication rate in obese patients was 12.5%. It was quite higher than observed in previous studies done by Bruce D.

Postoperative Hospital Stay:
In our series postoperative hospital stay in study group was (2.66±1.10 days) and in control group, it was (2.36±0.65 days),(p value=0.09) statistically insignificant. Barczynski et.al[8](2003) (2.5±0.43 days).

a) Aged:
In our series mean hospital stay (3.16±0.75 days) in aged population was significantly higher than mean hospital stay in control group (p value=0.01). Lujan et. al[20] (1997) (3.7±0.65) days.

b) Obese:
The mean hospital stay in our study (2.62±1.06 days) is not significantly different than in control group (P value=0.26). D. collet et.al (3.3±0.8 days).

COPD:
In our series no postoperative complication occurred in patients with lung diseases. Pursani G et.al[12](1998), Heich CH et.al[19] (2003).

In our study mean post-operative hospital stay in patients with lung disease was 2.43±1.21, Hsich CH et.al[19] (2003), (3.3±1.6 days). et.al[15](6.3%) (1991),. D. Collet et. al[16] (5.4) (1992), B. ammori et. al[11] (5.9%) (2001).

Liver Disease:
In our series no complication occurred in patient with liver disease. It was quite higher (13%) in previous studies of JiW LIL T et.al[18](2004), WUJI et.a[5] (2005).

Mean postoperative hospital stay in liver disease group was 2.96±0.96 days. Jiw, LiLT et.al[18] (2004) (5.6±2.4 days).

Postoperative hospital stay in one aged patient in whom procedure was converted to open cholecystectomy was 9 days. Postoperative hospital stays in two obese patients, who were converted to open cholecystectomy were 7 and 8 days respectively.

Postoperative hospital stay in one obese patient in whom procedure was converted to Standard pressure capnoperitoneum laparoscopic cholecystectomy was 3 days.

CONCLUSIONS

The following conclusions were drawn from the study

- In patients with co-morbid conditions mean blood loss (63.02±14.46ml) was significantly higher than patients without co-morbid condition (49.08 ± 15.26ml) (p value=0.0001).
- In patients with co-morbid conditions, mean operative time (61.06 ± 19.83 minutes) was significantly higher than patients without co-morbid condition (46.06 ± 19.83 minute) (p value=0.0006).
- Conversion rate (p value=0.42), intra-operative complication rate (p value>0.05), post-operative pain score (p value>0.05), postoperative complication, postoperative nausea and vomiting (p value>0.05),, mean time to resume diet(p value=0.05),, quality of life on day 5 (physical domain) and postoperative hospital (p value=0.09), were not different in patient with comorbid condition as compared to patient without comorbid condition.
- Low-pressure capnoperitoneum laparoscopic cholecystectomy is a safe treatment for cholecystitis in elderly. However they are at greater risk for conversion (p value= 0.04), slightly more blood loss (p value= 0.04), and operative time (p value= 0.02), and prolonged postoperative hospital stay (p value= 0.01).
- Low-pressure capnoperitoneum laparoscopic cholecystectomy is a safe treatment for cholecystitis in obese. However they are at greater risk
- For conversion (p value= 0.03), slightly more blood loss (p value= 0.005), and operative time (p value= 0.006).

- Low-pressure capnoperitoneum laparoscopic cholecystectomy is a safe treatment for cholecystitis in diabetes Mean blood loss (p value= 0.03) and postoperative complications were higher in diabetic patients.
- Low-pressure capnoperitoneum laparoscopic cholecystectomy is a safe treatment for cholecystitis in patients with cardiac diseases and in presence of liver disease with slightly more intraoperative blood loss.
- Low-pressure capnoperitoneum laparoscopic cholecystectomy in lung disease patients is as safe as patients without comorbid condition.
- Finally, we concluded that low-pressure capnoperitoneum laparoscopic cholecystectomy is feasible in comorbid condition.

There is no conflict of interest.

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