IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 16, Issue 12 Ver. XIII (Dec. 2017), PP 45-55
www.iosrjournals.org

Comparative Study Between Low Pressure Pneumoperitoneum And Standard Pneumoperitoneum on Operative Difficulty And Complications In Elective Laparoscopic Cholecystectomy In Grh, Madurai

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Abstract
Aim And Objectives: *To do Comparative Study between Low pressure pneumoperitoneum and Standard pneumoperitoneum on Operative Difficulty and complications in Elective Laparoscopic Cholecystectomy in GRH, Madurai*
methodology: *Patients who had Cholelithiasis and also normal CBD confirmed with ultrasound abdomen was selected for the study. Patients with uncontrolled systemic diseases or any complications in preop or intraop were excluded. Patients were posted for elective laparoscopic cholecystectomy. A total number of 100 patients will be enrolled in the study (50 in each group) and will be randomly allocated to one of the two groups. In group A, low pressure pneumoperitoneum (8mmhg) and in group B standard pressure (14mmhg) will be generated during laparoscopic cholecystectomy. Total duration of surgery, occurrence of bile spillage during operation, Operative Difficulty, Postoperative shoulder tip pain will be assessed at 4,8,24 hours after operation by Visual Analog Scale of Pain (V.A.S). The Pain scale scores ranging from 0 (no pain) to 10 (agonizing pain) will be used, allowed patient to mark a point along the scale that best represented their pain at that time. Analgesic requirements of all the patient in the postoperative period and length of hospital stay also recorded.*
Result: *Between LPP group and SPP group there was no difference between patients in terms of age, sex and body mass index. Visualisation was poor in only 2 patients of SPP group and 5 patients of LPP group. This difference was statistically not significant. Grasping was difficult in7 patients of LPP group but in SPP group only 2 patients had difficulty in grasping. Difference between two groups were statistically not significant. Bile spillage was present in 8 patients of LPP group but in only 5 patients of SPP group. This difference was statistically not significant. Duration of surgery >1hour in 9 patients of LPP and 5 patients of SPP group, <1 hour in 41patients of LPP group and 45 patients of SPP group. This difference is not statistically significant. In LPP group 48 patients, 1 patient, 1 patient discharged on 3^{rd},4^{th},5^{th} day. In SPP group, 46 patients, 2 patients and 2 patients discharged on 3^{rd},4^{th},5^{th} day. This difference is also not statistically not significant.Postoperative shoulder tip pain was present in 5 patients of LPP group and 14 patients of SPP group. This is statistically significant. The mean frequency of intensity of pain calculated at 4,8,24 hrs using Visual analog scale. In LPP group it was 2, 3.02 and 1.26 respectively. In SPP group it was 3.24, 4.02, 2.42 respectively. Intensity of pain was significantly lower in LPP group. In LPP group 25,18,7 patients had 0mg,75-150mg and >225mg analgesic postoperatively but in SPP group 10,15,25 patients had 0mg, 75-150mg and >225 mg analgesic respectively. In this LPP group is statistically difference in 0mg and >225 mg analgesic.*
Conclusion: *The results of our study and earlier studies shows that reducing the pneumoperitoneum pressure to 8mmhg during laparoscopic cholecystectomy can reduce the postoperative shoulder tip pain intensity and frequency and need for postoperative analgesic without compromising perfection during surgery. Duration of surgery & duration of hospital stay shows not much difference . So by simple manouvre of keeping Low pressure pneumoperitoneum during laparoscopic cholecystectomy which is the gold standard at present, postoperative morbidity can be significantly decreased.*

Date of Submission: 09-12-2017 Date of acceptance:03-01-2018

I. Introduction

During the past several decades, numerous individuals cultivated and promoted the access for laparoscopy. The big development in the field of laparoscopy was made by invention of computer chip television camera. This scientific modernization implement the means to program a magnified picture of the operation field on to the monitor, facilitating performance of complex laparoscopic procedures, better results

with least damage. The future is today however the emerging of any advanced machinery built upon how well our practice is.Some of diseases which were not dealt due to fear of damage to

surrounding structures during access are presently						been treated easily with	
laparoscopic	surgery.	Laparoscopy	has	had	a	profound	influence on
treatment	patients	with	impalpable	testes,		gallbladder	disease,
endometriosis,	colorectal	diseases	and	Hirschsprung's			disease'.
Everything	comes with	having both	the	advantages and			disadvantages.

Main advantages of laparoscopic surgery include; reduction of tissue traumdue to small skin incisions, reduction in adhesion formation, reduction in

patient morbidity, shortening of duration		of hospital stay		and early return	
to normal activity. Furthermore,	when	the laparoscopic		procedures	are
performed in a minimally invasive	pattern there		will be	less chance	of

laparoscopy,		Natural orifice	transluminal endoscopic		surgery	all	are
becoming popular and being			widely accepted	and practiced all over			the
world.	But	unfortunately very	little importance	is being	given	on	the
adverse	effects of laparoscopy		on the patient's	body.			
internal	scarring correlated to standard open surgery. With the				interest to		
achieve	maximum outcome with the		best	cosmesis,	advances		like

Laparoscopic Cholecystectomy is superior to Open procedure in reducing postoperative morbidity and better quality of life. Standard pressure of 14-15 mmhg associated with significant postoperative shoulder tip pain. By simply reducing Pneumoperitoneum pressure to 7-8 mmhg can decrease the postoperative shoulder tip pain. So we decided to do study comparing standard pressure pneumoperitoneum and Low pressure pneumoperitoneum during elective laparoscopic cholecystectomy with respect to frequency & severity of postoperative shoulder tip pain, analgesic need,operative difficulty, duration of surgery and hospital stay.

I. Aims And Objectives

To study the frequency and intensity of postoperative shoulder tip pain in laparoscopic cholecystectomy and compare low pressure versus standard pressure pneumoperitoneum during elective laparoscopic cholecystectomy with respect to postoperative shoulder tip pain in GRH, MADURAI

II. Material And Methods

2.1 Study Method

2.2 Aim And Objectives

To do Comparative Study between Lowpressure pneumoperitoneum and Standard pneumoperitoneum on Operative Difficulty and complications in Elective Laparoscopic Cholecystectomy in GRH,Madurai

Design Of Study - Prospective Study
Period Of Study - 6 Months

Selection Of Subjects – All patients satisfying inclusion criteria admitted in Govt.Rajaji Hospital for period of 6 months

Data Collection : Data regarding history, clinical examination, USG, Intraoperative pneumoperitoneum ressure nd postoperative pain assessment

Inclusion Criteria

1. Elective surgery for gallstone diseases
2. Normal Common bile duct (on preoperative ultrasound)
3. Patients conented for inclusion in the study according to the designated proforma

Exclusion Criteri

1. Conversion to open cholecystectomy
2. Acute inflammation or any other complication of gallstone disease
3. Choledocholithiasis
4. C0-existing liver disease
5. Any intraoperative or postoperative complications such as bile duct injury, bile duct obstruction, infection and high fever
6. Uncontrolled medical diseases like DM, Hypertension,Coronary Artery Diseases,COPD,Asthma

7. Patients with significant Portal Hypertension,uncorrectable coagulopathies,suspected gallbladder carcinoma,cirrhosis and generalized peritonitis

III. Methodology

A total number of 100 patients will be enrolled in the study (50 in each group) and will be randomly allocated to one of the two groupIn group A, low pressure pneumoperitoneum (8mmhg) and in group B standard pressure (14mmhg) will be generated during laparoscopic cholecystectomy
Total duration of surgeryThe occurrence of bile spillage during operationOperative DifficultyPostoperative shoulder tip pain will be assessed at 4,8,24 hours after operation by Visual Analog Scale of Pain (V.A.S)The Pain scale scores ranging from 0 (no pain) to 10 (agonizing pain) will be used, allowed patient to mark a point along the scale that best represented their pain at that timeAnalgesic requirements of all the patient in the postoperative period and length of hospital stay also recorded

IV. Statistical Analysis

The degree of postoperative shoulder tip pain was assessed by means of visual analog scale at 4,8,12 hours thereafter.The pain scale, with scores ranging from 0(no pain) to 10 (unbearable pain), was constructed without numeration,allowing patients to mark a point along the scale that best served to analyse the presence and intensity of shoulder tip pain alone and was not a representation of generalized postoperative generalized discomfortAnalgesic requirements of all patients in the postoperative period and length of hospital stay were also recorded Stastical analysis was carried out using the chi-square and independent student t tests A p value <0.05 was taken as statistically significant

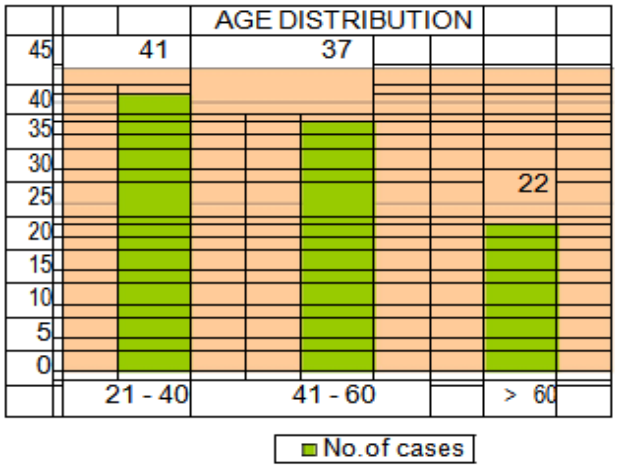
V. Observation And Analysis Of Results

Total of 100 patients were divided into two groups. Standard Pressure Pneumoperitoneum (SPP) group consisting of 50 patients and Low Pressure Pneumoperitoneum (LPP) group consisting of 50 patients.

TABLE 1 Age Wise Distribution Of Patients In Both Groups

Age in years	No. of cases	LPP	SPP
21 – 40	41	22	19
41 – 60	37	16	21
> 60	22	12	10
Total	100	50	50
Mean		46.84	47.54
SD		14.04	14.19
p value		0.805 Not Sig	

In our study out of 50 patients in LPP group 22 patients were between 21-40 years, 16 patients were between 41-60, 12 patients were >60yearsOut of 50 patients in SPP group 19 were between 21-40years, 21patients were between 41-60years, 10 patients were >60yearAge of patients between two groups statistically not significant



Graph 1. Showing Age Wise Distribution Of Patients Inboth The Groups
Table 2 Sexwise Distribution Of Patients In Both Groups

Sex	LPP	SPP	p value
Male (50)	33	17	1.0
Female (50)	17	33	Not Sig
Total	50	50	

In our study Out of 50patients in LPP group 33 were male and 17 were female. Out of 50 patients in SPP group 17 were males and 33 were females Sex distribution of patients between two groups is statistically not significant.

GRAPH 2. Showing Sexwise Distribution Of Patients I Both Groups

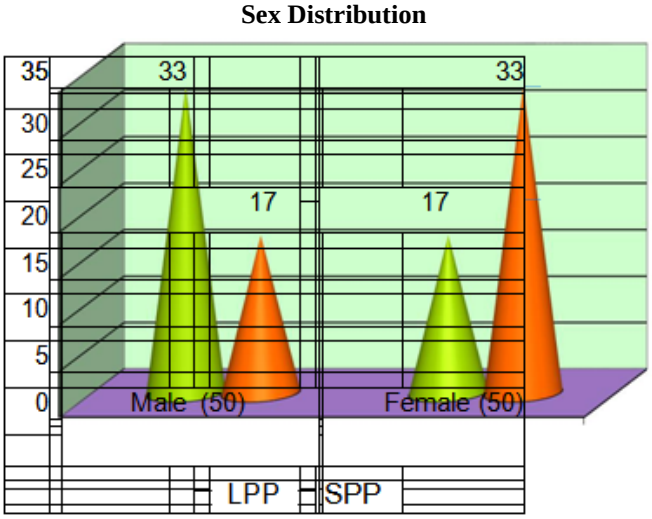


Table. 3 Asa Grade Of Patients In Both The Groups

ASA	LPP	SPP	p value
I (50)	38	12	1.0
II (50)	12	38	Not Sig
Total	50	50	

Out of 50 patients of LPP group 38 were ASA I and 12 were ASA II. Out 50 patients of SPP group 12 were ASA I and 38 were ASA II

Graph 3. Showing Asa Grade Of Patients In Two Groups

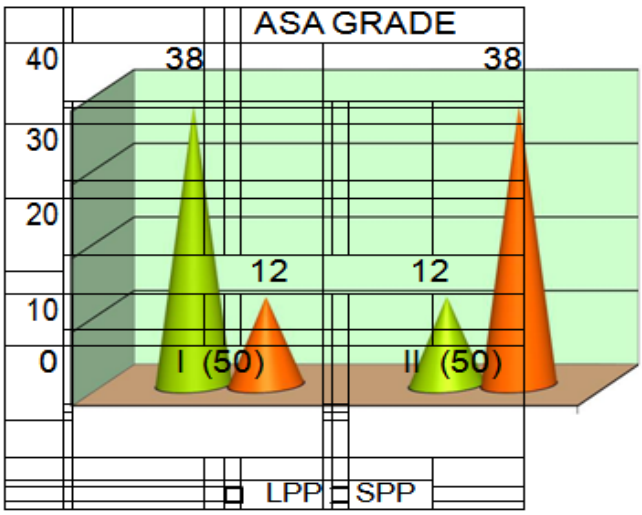


TABLE 4

Comparison Of Operation Difficulty – Visualization Between Two Groups

	Visualisation		
Group	Good	Poor	p value
LPP	45	5	0.433
SPP	48	2	Not Sig

On comparing Visualisation during surgery between two groups, out of 50 patients of LPP group 45 patients good and 5 patients poor and out of 50 patient of SPP group 48 patients visualization good and 2 patients visualization poor

Graph 4. Shows Comparison Of Operative Difficulty-Sualization Between Two Groups

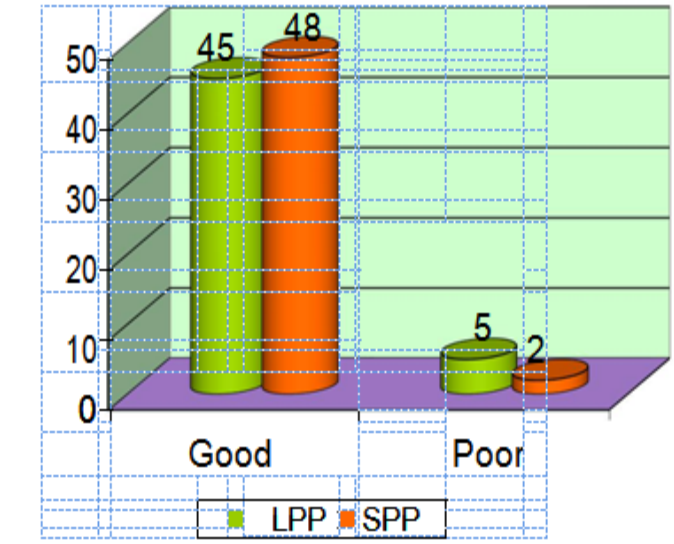


Table.5 comparison Of Operative Difficulty-Grasping Betweentwo Groups

	Operative Difficulty		
	Grasping		
Group	Easy	Difficult	p value
LPP	43	7	0.160
SPP	48	2	Not Sig

On comparing Grasping between two groups out 50 patients of LPP 43 patients was easy and 7 patients was difficult, out of 50 patients of SPP 48 patients was easy and 2 patients difficult

Graph.5 Showing Comparsion Of Operative Difficulty-

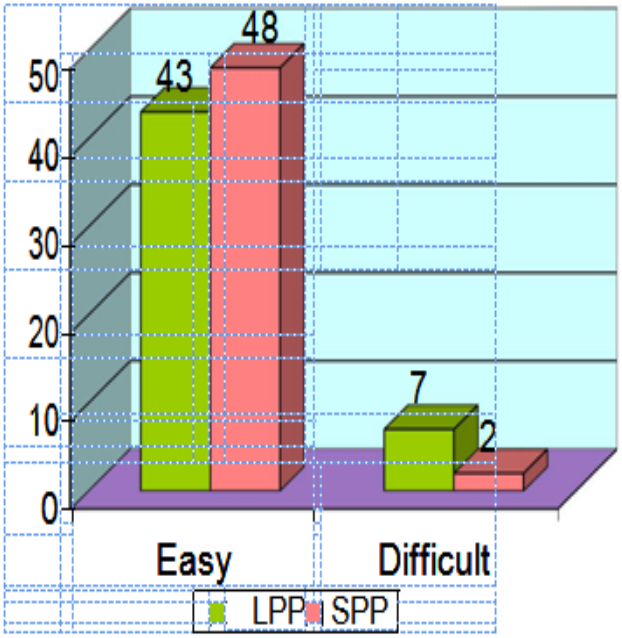

48
43
50
40
30
20
10
0
7
2
Easy
Difficult
LPP
SPP

Table.6 Comparison Of Bile Spillage Between Two Groups

	BILE SPILLAGE		
Group	Yes	No	p value
LPP	8	42	0.552
SPP	5	45	Not Sig

On comparing Bile spillage between two groups, out of 50 patients of LPP group 8 had and 42 didn't have bile spillageOut of 50 patients of SPP group 4 had and 45 didn't have bile spillage

Graph 6. Showing Comparison Of Bile Spillage Between

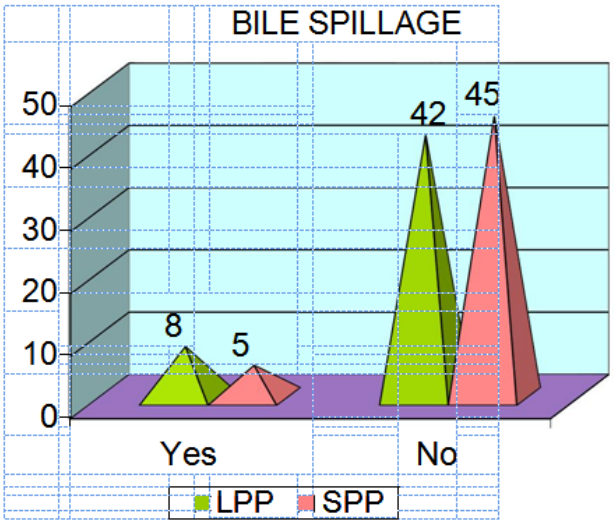
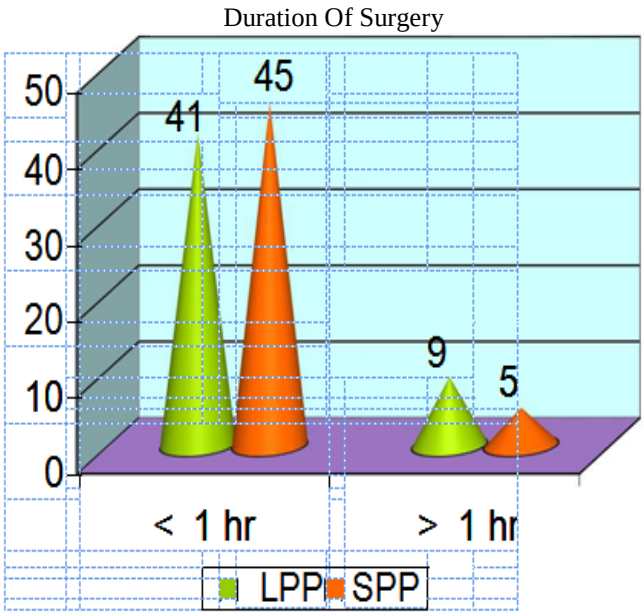


Table7. Comparison Of Duration Of Surgery Between Two Groups

	Duration of Surgery		
Group	< 1 hr	> 1 hr	p value
LPP	41	9	0.387
SPP	45	5	Not Sig

Duration of surgery was <1 hour in 41 patients of LPP and 45 patients of SPP groups, >1hour in 9patients of LPP group and 5 patients of SPP group

Graph.7 Showing Comparison Of Duration Of Surgery Between Two Groups



Duration of Hosp.stay	LPP	SPP	
3 days	48	46	p value
4 days	1	2	0.678
5 days	1	2	Not Sig

Among 50 patients of LPP group 48 patients discharged on 3rd day,1 patient discharged on 4th day and 1 patient discharged on 5th dayAmong 50 patients of SPP group 46 patients discharged on 3rd day, 2 patient discharged on 4th day and 2 patients discharged on 5th days

Graph 8. Showing Comparison Of Duration Of Hospital Stay Between Two Groups

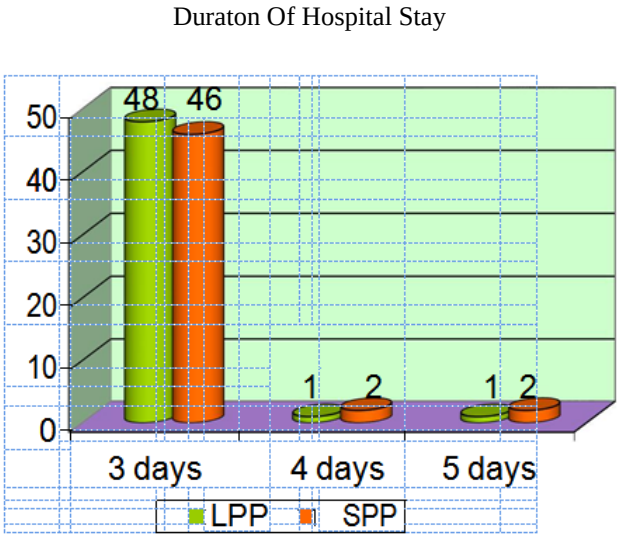


Table.9 Comparison Of Shoulder Tip Pain Between Two Groups

	Shoulder tip Pain		
Group	Yes	No	p value
LPP	5	45	0.041
SPP	14	36	Significant

n our study 45 patients of LPP and 36 patients of SPP didn't have postoperative shoulder tip pain 5 patients of LPP and 14 patients of SPP had postoperative tip pain,

Graph 9. Showing Comparison Of Shoulder Tip Pain Between Two Groups

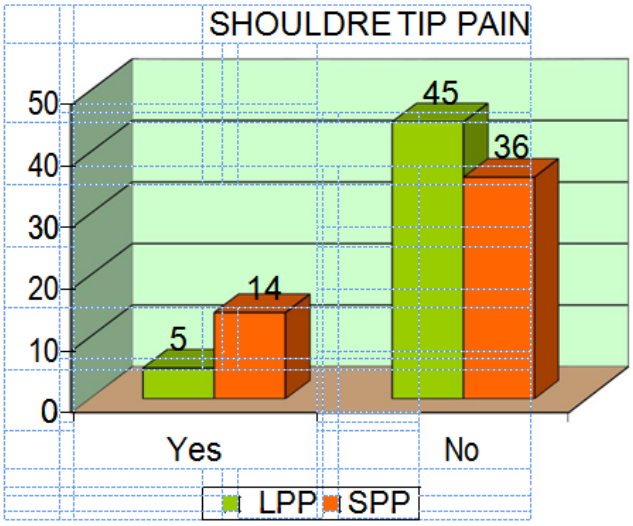


TABLE 10. Comparison Of Frequency Of Pain Interval Between Two Groups

	SPP	p value	
Interval			
4 hrs	3.24	<0.001	Significant
8 hrs	4.02	<0.001	Significant
24 hrs	2.42	<0.001	Significant

In our study Mean Frequency of intensity of pain interval LPP at 4hrs, 8hrs, 24hrs were 2, 3.02, 1.26 and SPP at 4hrs, 8hrs, 24hrs were 3.24, 4.02 and 2.42 These are statistically significant

Graph.10 Showing Comparison Of Mean Frequency Of Intensity Of Pain Between Two Groups

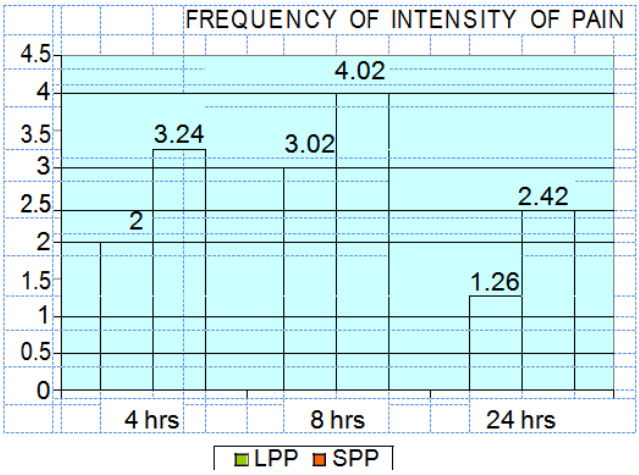
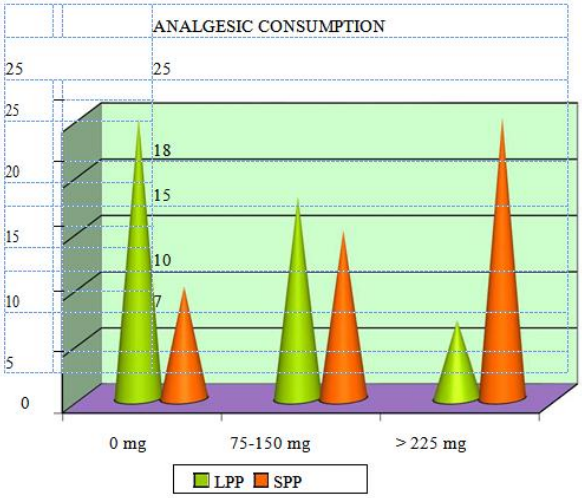


Table11. Comparison Of Analgesic Consumption Between Two Groups

	Analgesic Consumption		
Group	0 mg	75-150 mg	> 225 mg
LPP	25	18	7
SPP	10	15	25
p value	0.003	0.671	<0.001
	Significant	Not Sig	Significant

In our study out of 50 patients of LPP group 25 patients didn't need any analgesic, 18 patients needed 75-150 mg of analgesic and 7 patients needed analgesic >225mgOut of 50 patients of SPP group 10 patients didn't need analgesic, 15 patients needed 75-150 mg of analgesic and 25 patients needed analgesic >225mg

Graph11. Showing Comparison Of Analgesic Consumption Between Two Groups



VI. Result

In our study 100 patients were divided into Low Pressure Pneumoperitoneum (LPP) group and Standard Pressure Pneumoperitoneum (SPP) group and 50 patients in each group. Between LPP group and SPP group there was difference between patients in terms of age, sex and body mass index. Patients who had Cholelithiasis and also normal CBD confirmed with ultrasound abdomen was selected for the study. Patients with uncontrolled systemic diseases or any complications in preop or intraop were excluded. Patients were posted for elective laparoscopic cholecystectomy. In LPP group pneumoperitoneum pressure was kept at 8 mmhg and SPP group pneumoperitoneum pressure kept at 14-15 mmhg. Operative difficulty,Duration of Surgery,Duration of hospital stay,Postoperative shoulder tip pain and Mean Frequency of Intensity of pain and analgesic consumption was noted.Pain score was calculated using Visual Analog Scale(V.A.S) at 4hr,8hr, 24hr respectively.Operative difficulty in terms of visualization and grasping between two groups was noted between two groups. Visualisation was poor in only 2 patients of SPP group and 5 patients of LPP group. This difference was statistically not significant. Grasping was difficult in 7 patients of LPP group but in SPP group only 2 patients had difficulty in grasping. Difference between two groups were statistically not significantBile spillage was present in 8 patients of LPP group but in only 5 patients of SPP group. This difference was statistically not significant.Duration of surgery >1hour in 9 patients of LPP and 5 patients of SPP group, <1 hour in 41patients of LPP group and 45 patients of SPP group. This difference is not statistically significant. In LPP group 48 patients, 1 patient, 1 patient discharged on 3^{rd},4^{th},5^{th} day.In SPP group, 46 patients, 2 patients and 2 patients discharged on 3^{rd},4^{th},5^{th} day. This difference is also not statistically not significant. Postoperative shoulder tip pain was present in 5 patients of LPP group and 14 patients of SPP group. This is statistically significant.The mean frequency of intensity of pain calculated at 4,8,24 hrs using Visual analog scale. In LPP group it was 2, 3.02 and 1.26 respectively. In SPP group it was 3.24, 4.02, 2.42 respectively. Intensity of pain was significantly lower in LPP group.In LPP group 25,18,7 patients had 0mg,75-150mg and >225mg analgesic postoperatively but in SPP group 10,15,25 patients had 0mg, 75-150mg and >225 mg analgesic respectively. In thisLPP group statistically difference in 0mg and >225 mg analgesic

VII. Discussion

With the establishment of laparoscopic cholecystectomy as gold standard for the management of cholelithiasis, there has been a series of untiring efforts to evolve and increase its safety. The aim has been to reduce the trauma especially during access, increasing surgeon and patient satisfaction and decreasing operative difficulty during the procedure. Attention focused towards reduction of pain, improved early postoperative recovery, early return to work and better quality of life. The traditional teaching has been to create a pneumoperitoneum with a SPP of 14-16 mm Hg by insufflating carbon dioxide into the peritoneal cavity before the insertion of ports. The added advantage was the raised abdominal wall and creating an iatrogenic space for proper visualization of gallbladder along with surrounding organs and adequate enough to manipulate laparoscopic instruments with ease. However pneumoperitoneum with carbon dioxide gas at the pressures commonly used has been shown to be associated with unique and specific side effects both in intraoperative and postoperative period. To negate these specific problems, the idea of LPP with carbon dioxide was introduced. Research studies have indicated that the use of LPP is associated with better intra-operative tolerance (including anesthesia tolerance) and improved postoperative recovery with reduced intensity of the surgical pain. Various authors have reported that laparoscopic cholecystectomy performed with LPP resulted in a better postoperative quality of life as compared to laparoscopic cholecystectomy performed with SPP. Postoperative pain following laparoscopic cholecystectomy is related to a numberof factors like tissue injury at port site insertion and gallbladder dissection or peritoneal stretch, diaphragmatic stretch and chemical irritation of the peritoneum by pneumoperitoneum due to carbon dioxide. Apart from generalized postoperativediscomfort shoulder tip pain is a common cause of morbidity following laparoscopic cholecystectomy with a reported incidence of 30-50%. Published literature has reported that the incidence and intensity of postoperative shoulder tip pain was significantly less in the patients undergoing LPP laparoscopic cholecystectomy when compared to ones undergoing SPP laparoscopic cholecystectomy. Our study also shows significant low frequency of shoulder tip pain in LPP group.Several researches including different intraoperative techniques like saline washing, intraperitoneal aesthetic application and perioperative analgesics combinations have been conducted to find out ways to reduce the frequency and intensity of shoulder tip pain. The results of our study demonstrates the effectiveness in reducing this morbidity by simply reducing the pneumoperitoneum pressures to low values ~ 8 mm Hg.. Intensity of shoulder tip pain as validated by calculating pain scores using VAS revealed that postoperative shoulder-tip pain was significantly less intense in the LPP group. Various randomized trials published so far also the same observations but according to a recent Cochrane review are plagued with a high risk of bias. Although the pain scores differed between the two groups, quite a few patients who did not require any analgesic medications existed in both groups.. Also patients with LPP laparoscopic cholecystectomy consumed

significantly lower doses of analgesic for effective pain control. Published literature also supports that incidence and intensity of postoperative pain is significantly lower in LPP with fewer requirements of analgesics in the postoperative period.Surgeon's satisfaction in terms of visualization, grasping matched in both groups with no statistical difference in terms of bile spillage and total hospital stay.

VIII. Conclusion

The results of our study and earlier studies shows that reducing the pneumoperitoneum pressure to 8mmhg during laparoscopic cholecystectomy can reduce the postoperative shoulder tip pain intensity and frequency and need for postoperative analgesic without compromising perfection during surgery. Duration of surgery & duration of hospital stay shows not much difference . So by simple manouvre of keeping Low pressure pneumoperitoneum during laparoscopic cholecystectomy which is the gold standard at present, postoperative morbidity can be significantly decreased.

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