

# Impact of Standard and Low-Pressure Pneumoperitoneum on Intraoperative Complications in Laparoscopic Cholecystectomy

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## ABSTRACT

**Aim:** To compare LPP and SPP laparoscopic cholecystectomy regarding efficiency and complications

**Methodology:** Sixty patients were enrolled. Patients were divided into two groups. 30 patients were placed in each group A and B. The intensity of postoperative shoulder pain was assessed by using visual analog scale (VAS) at 4,8,12 and 24 hours after surgery. Nausea & vomiting episodes also measured at 4,8,12 and 24 hours after surgery. The length of operation, intra-operative findings, intra-operative complications (bile spilling, visceral injury and hemorrhage), and hospital stay were also noted.

**Results:** Patients in this study were divided into two groups: group A and B. The frequency of shoulder pain at different periods was from 0 to 7 i.e. No pain, Mild, Moderate, and worst which was counted by the minimum to maximum i.e. 2 and 7 at 4 hours, 2 and 9 at 8 hours, 1 and 8 at 12 hours and 0 to 8 at 24 hours. Regarding intra-operative complications i.e. Bile Spillage, bleeding and visceral injury, only a few patients had bouts of nausea/vomiting in the 4 hours and 24 hour time intervals. However, more patients were affected by this condition at 8 and 12-hour intervals.

**Conclusion:** LP laparoscopic surgery is an achievable alternative to SP laparoscopic procedure for benign issues of gall stone. LPP is a better choice for the LC since it minimizes post-operative pain of the shoulder & the PONV while causing no significant increase in intraoperative complications.

**Keywords:** Laparoscopic surgery, low pressure pneumoperitoneum, standard pneumoperitoneum

## INTRODUCTION

Laparoscopic cholecystectomy is a method of removing gall bladder through three or four small incisions using laparoscopic technique. Laparoscopic surgery has several advantages, including a smaller surgical wound, less postoperative pain, a shorter hospital stay, faster healing, and a better cosmetic result<sup>1</sup>. Pneumoperitoneum is created by the insufflation of the abdominal or peritoneal cavity with CO<sub>2</sub> using an automated insufflator during laparoscopic cholecystectomy. Pneumoperitoneum inflates the abdomen, making it easier to visualize internal organs and providing enough room for instrument maneuverability. Possible side effects of pneumoperitoneum are acid-base problems, decreased pulmonary compliance, nausea and vomiting, and postoperative shoulder pain.<sup>2</sup> CO<sub>2</sub> is the preferred gas for creating pneumoperitoneum since it is non-combustible and extremely blood soluble<sup>3</sup>.

## METHODOLOGY

**Sample selection:** Group A is of Low pressure pneumoperitoneum (LPP) (6-10mmHg) and Group B is of standard pressure pneumoperitoneum (SPP) (12-16 mm Hg).

**Inclusion Criteria:** Age between 20 to 60 years, ASA class one and two and elective procedure of LC for uncomplicated and symptomatic gallstone disease.

**Exclusion Criteria:**

- Patients with H/o diabetes and hypertension.
- Pregnant patients

Table 2: Time periods

Time periods (Hrs)	Mean	Mode	SD	Skewness	Std. error of skewness	Kurtosis	Std. error of kurtosis
4	3.35	2	1.77	0.50	0.31	-0.93	0.61
8	4.77	3	2.17	0.81	0.31	-0.62	0.61
12	3.73	2	2.09	0.76	0.31	-0.38	0.61
24	2.37	1	1.81	1.21	0.31	0.73	0.61

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- Patients receiving NSAIDS or on any other analgesic medication.
- Those undergoing LC with CBD exploration
- Laparoscopic cholecystectomy converted to open surgery.

Patients between the ages of 20 and 60 were enrolled, who had an elective LC for uncomplicated and symptomatic gallstone disease. After getting approval from the ethical committee of the hospital, the study was carried out in Mayo Hospital's West Surgical Ward, Lahore. The use of the VAS was taught to potential study participants prior to surgery. The length of the procedure, intra-operative findings, intraoperative problems i.e. bile spilling, bleeding, visceral injury and stay in hospital were documented. The reasons for converting into a standard pressure LC or an open procedure of cholecystectomy were documented as well. All patients had got the same analgesic and antiemetic medication during the postoperative period. At 4, 8, 12, and 24 hours following surgery, the degree of postoperative shoulder pain was measured using the VAS. At 4, 8, 12, and 24 hours, the rate of nausea and vomiting were reported. The SPSS version 26 was used to analyze the data.

## RESULTS

A total of 60 patients were enrolled.

Table 1: Age distribution in groups

Groups	A (LPP)	B (SPP)
N=	30	30
Age ranges (Yrs)	20-60	23-56

Table 3: Intra operative complications

	Mean	Mode	SD	Skewness	Std. error of skewness	Kurtosis	Std. error of kurtosis
Bile spillage	1.97	2	0.18	- 5.33	0.31	27.4	0.61
Bleeding	1.97	2	0.18	- 5.33	0.31	27.4	0.61
Visceral injury	2.0	2	-	-	0.31	-	0.61

Table 4: Frequency of nausea and vomiting

Time periods (Hrs)	Mean	Mode	SD	Skewness	Std. error of skewness	Kurtosis	Std. error of kurtosis
4	1.97	2	0.18	- 5.33	0.31	27.4	0.61
8	1.63	2	0.49	- 0.57	0.31	- 1.74	0.61
12	1.73	2	0.45	- 1.08	0.31	- 0.86	0.61
24	1.97	2	0.18	- 5.33	0.31	27.4	0.61

## DISCUSSION

The prevalence of postoperative shoulder pain is reduced markedly when LPP is performed i.e. 6 to 10 mmHg. When compared to the SPP group, the LPP group had a 2.5 fold lower incidence of shoulder pain. This is consistent with past research done by Arslan M et al<sup>4</sup>. This research showed that LPP is effective in the severity of shoulder. Shoulder pain begins 2–6 hours after surgery and gradually increases in intensity and maximum at 12 hours and then fade. The degree of shoulder pain in the SPP group was markedly higher at 8 & 24 hours after the procedure.

Our finding of delayed shoulder discomfort pain and its importance in the first 8 and 24 hours following surgery is backed by many previous researches. Shoulder pain necessitated additional analgesics in the SPP group and this change wasn't statistically that significant after 8 hours, but it was ( $p=0.05$ ) after 24 hours. The fact suggests that the recovery of the patients was not smooth in the SPP group. Both groups experienced similar post-operative pain of the shoulder, which lasted on an average of around 2.7 days. This is directly opposite to some studies which were published previously, as the shoulder pain can continue up to ten days after surgery<sup>5</sup>.

The duration of postoperative shoulder pain appears to be influenced by the length of time spent in surgery. Shoulder pain lasts longer in individuals who have surgery that takes >45 minutes compared to those who have surgery that takes <45 minutes. Post-operative abdominal and shoulder pain after LPP is also affected by pneumoperitoneum residual volume. Sarvestani et al<sup>7</sup>. calculated the quantity of pneumoperitoneum by using chest x-ray that remained 24 hours after LPP.

The SPP group experienced more shoulder pain at 8 & 24 hours after the procedure but the length of stay in hospital was equivalent in both groups. As a result, while shoulder pain causes patients to be concerned, it does not appear to lengthen their hospital stay. Many researches have discovered that patients who are operated with LPP spend less time in the hospital, which saves money and improves patient satisfaction. However, we always kept patients in the hospital for 24 hours after LC<sup>6</sup>.

Operating times under SPP and LPP were shown to be equivalent in another trial. According to a meta-analysis, surgery with LPP takes two minutes longer than surgery with SPP. The main problem with LPP is the risk of compromising proper exposure and operating area.<sup>8</sup> In another study, the greater the intraabdominal pressure, the better the vision and it is a generally held belief among laparoscopic surgeons<sup>5</sup>.

## CONCLUSION

Our findings suggest that laparoscopic cholecystectomy performed under 9 to 10 mmHg intra-abdominal pressure is effective as compared to SPP.

**Conflict of interest:** Nil

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