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And Antonia	Original Research Paper	General Surgery
	A FOLLOW-UP STUDY - LOW-PRESSURE PNEUMOPE STANDARD PNEUMOPERITONEUM IN LAPAROSCO	RITONEUM COMPARED TO OPIC CHOLECYSTECTOMY
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ABSTRACT Introduction -: Post-laparoscopic pain syndrome is well conceded and characterized by abdominal and especially shoulder tip pain. It occurs frequently following laparoscopic cholecystectomy. The etiology of post-laparoscopic pain can be classified into three aspects visceral, incision, and shoulder. This study purposed to compare the frequency and strength of shoulder tip pain between low pressure (7 mmHg) and standard pressure (14 mmHg) in a prospective randomized clinical test.

Methods -: One hundred forty successive patients undergoing elective laparoscopic cholecystectomy were randomized prospectively to either low or high-pressure pneumoperitoneum. The statistical analysis included mean age, weight, sex, duration of surgery, conversion rate, American Society of Anesthesiologists (ASA) grade, operative time, incidence and severity of shoulder tip pain, and post-operative hospital stay.

Results -: The patient's quality was similar in the two groups except for the predominance of males in the standard-pressure group. The plan of action was successful in 68 of 70 patients in the low-pressure group. The number of analgesic injections, visual analog score, operative time, and length of post-operative days were the same in all groups. Occurence of shoulder tip pain was higher in the standard-pressure group, but not statistically significantly so (p = 0.100) (27.9% versus 44.3%).

Conclusions -: Low-pressure pneumoperitoneum tended to be better than standard-pressure pneumoperitoneum in a period of lower incidence of shoulder tip pain. Still, this difference did not reach statistical significance following elective laparoscopic cholecystectomy.

KEY WORDS : Pneumoperitoneum, Laparoscopic cholecystectomy

# **INTRODUCTION-:**

Post-laparoscopic pain syndrome is well recognized in the gynecological literature and is characterized by abdominal and specially shoulder-tip pain from one to two days after laparoscopy.<sup>[1,2]</sup> In inclusion, the reported incidence of shoulder tip pain following laparoscopic cholecystectomy varies between 30% and 50%.<sup>[3,4]</sup> There have been some reports collating low- and high-pressure pneumoperitoneum. Still, some have demonstrated that low pressure was associated with lower post-operative pain and lower incidence of shoulder tip pain.<sup>[5,6]</sup> Dexter et al.<sup>[7]</sup> demonstrated that low-pressure (7-mmHg) capnoperitoneum was related to less depression of cardiac output without compromising laparoscopic feasibility. We performed a randomized prospective clinical test on the frequency and intensity of shoulder-tip pain to collate to low and high-pressure pneumoperitoneum in patients undergoing laparoscopic cholecystectomy.

# MATERIAL AND METHODS -:

The patients invited to join in the trial had to meet the inclusion criteria, including 140 successive adults with the American Society of Anesthesiologists (ASA). The local ethics committee accepted this trial. The patients were undergoing elective laparoscopic cholecystectomy for benign gallbladder disease from July 2020 to April 2021. The preoperative exclusion criteria were patients younger than 18 years. Patients who were found to need different procedures at surgery were excluded from the analysis. The laparoscopic cholecystectomy in this study was performing by surgeons with standard American techniques. Patients were randomized prospectively by computer generation after induction of anesthesia. Open laparoscopy (Hasson trocar) was performed at the umbilicus on the patients in every group, and insufflated CO2 was started at a rate of 1 L/min until the abdominal pressure of either 14 mmHg high-pressure or seven low-pressure groups was reached. Then Laparoscopic cholecystectomy was performed at an insufflation rate of 12 L/min. In all cases, the remaining carbon dioxide pneumoperitoneum was evacuated at the end of the

procedure by compressing the abdomen while taking care to keep the valve of the trocar open. Duration of surgery, intraoperative complication, and reasons for converting to open operation was recorded. The researcher asked the patient about the extent of shoulder-tip or back pain, scored as 0 or mild. The number of patients needed for this study was calculated based on 80% power to detect a significant difference in the shoulder-tip pain requiring analgesia consumption at a 5% significant level.

### **RESULTS AND DISCUSSION-:**

One hundred forty successive patients were randomized into two equalized groups (n = 70). The weight, age, and ASA grades of the groups were similar (Table 1). In terms of patient sex, there was a higher proportion of men in the 14 mmHg group (group B). Low-pressure (7-mmHg) laparoscopic cholecystectomy was successfully performed in 68 (97.14%) of 70 patients in group A. In the two cases, the pressure rose to 14 mmHg to create an operative field feasible for the operation due to patient fatness. For the standard pressure group (group B, 14 mmHg), 70 patients were successfully operated on. Mean period of operative time was similar in the two groups, i.e.,  $61.32 \pm 22.58$  min and  $62.54 \pm 20.30$  min in groups A and B, respectively (p = 0.739). There were no crucial intraoperative complications in either group. The number of analgesic injections was also the same in the two groups, i.e.,  $0.57 \pm 0.77$ doses and 0.69  $\pm$  0.86 doses in groups A and B, respectively (p = 0.424). The time of post-operative stay was also similar in the two groups, i.e.,  $1.13 \pm 0.38$  days and  $1.29 \pm 0.70$  days in groups A and B, respectively (p = 0.116) (Fig.1). Mean intensity of post-operative pain assessed by the VAS scale was not significantly different between the two groups, i.e.,  $3.14 \pm 2.20$ and 4.04  $\pm$  2.06 in groups A and B, respectively (p = 0.070) (Fig.1). The proportion of patients that reported post-operative shoulder-tip pain presenting in the time during the first days after the operation was lower in group A than in group B. In group A, there was no shoulder or back pain in 72.1% of patients, compared within 55.7% of patients in group B (p =0.280), and severe shoulder or back pain was reported with lower incidence in group A than in group B, i.e., 2.9% and

8.6%, respectively. However, this disparity between the two groups did not reach statistical significance (p = 0.160).

Group A (7 Group B (14 p-value mmHg, N = 70)mmHg, N = 70) $55.23 \pm 13.20$ Age, mean  $\pm$  SD  $54.00 \pm 12.93$ 0.582 (27 - 78)(20 - 84)(range), years Sex 9:59 18:52 0.051 (Male:Female), N Weight, mean ±  $59.75 \pm 10.45$  $60.86 \pm 13.25$ (35.5 - 94.0)0.590 SD (range), kg (27.6 - 89.0)Group A (7 mmHg, N = 70) Group B (14 mmHg, N = 70) p-valu 61.32 ± 22.58 (25-135) 62.54 ± 20.30 (30-130) Operative time, mean ± SD (range), mir 0.739 Analgesic injection, mean + SD (range), doses  $0.57 \pm 0.77 (0-4)$  $0.69 \pm 0.86(0-4)$ 0.424 1.29 ± 0.70 (1-5)  $1.13 \pm 0.38 (1-3)$ Length of postoperative stay, mean ± SD (range), days 0.116 Oral paracetamol, mean ± SD (range), doses 7.01 ± 7.03 (0-26) 5.09 ± 4.72 (0-22) 0.424 ASA grade (1-3), median (range) 1(1-3)1 (1-3) 0.271 VAS (1-10), mean ± SD (range)  $3.14 \pm 2.20(1-10)$  $4.04 \pm 2.06 (1-9)$ 0.070 Shoulder and back pain 0 = 55.7%0.280 0 = 72.1%1 = 25.0%1 = 35.7%0.370

2 = 2.9%

2 = 8.6%

0.160

### Fig-1 Patient outcomes

Table-1-Demographic data

There were no unique complications in either group, and the surgery period was comparable in the two groups. Operating at a low insufflation pressure means that insertion of the cannulae is more difficult, and thus extra care is necessary to avoid injury to the viscus. Lessen operative risks, inflation by gas could be used as an open technique (Hasson trocar). If there is confirmation that the operative field is not workable in the low-pressure group, there should be no hesitation in increasing the pressure to 14 mmHg, as in this series. In this trial, conversion to high-pressure pneumoperitoneum was needed in 2 of 70 cases; both of these patients were somewhat obese. However, the adulthood of the patients could be operated on quickly and safely with low-pressure pneumoperitoneum. This study showed that severe shoulder pain requiring analgesia occurred less in the low-pressure group than in the standard pressure group, but this difference did not reach statistical significance. In this trial, low-pressure pneumoperitoneum proved to be sufficient for performing laparoscopic cholecystectomy in as many as 97.14% of patients. Low intra-abdominal pressure has been described to have a benefit in terms of minor catecholamine release in pheochromocytoma.

# CONCLUSION -:

This study demonstrated that reducing the pneumoperitoneum pressure to 7 mmHg tended to produce a lower incidence of post-operative shoulder-tip pain (27.9% versus 44.3%) and lower intensity of shoulder-tip pain when reported. However, these differences did not reach statistical significance (p = 0.100). Thus, the low-pressure technique could be employed in the majority of patients subjected to laparoscopic cholecystectomy. However, in some situations that may affect the operative field, e.g., in obese patients, the pneumoperitoneum pressure should be increased until the exposure is adequate.

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