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# INTRAPERITONIAL BUPIVACAINE FOR POSTOPERATIVE ANALGESIA IN LAPAROSCOPIC CHOLECYSTECTOMY: A COMPARATIVE STUDY

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## ABSTRACT

Objective: To compare the effect of intraperitoneal bupivacaine for post-operative pain management in patients undergoing laparoscopic cholecystectomy. Material and Methods: Thirty group A patients received 20 ml of 0.9% normal saline as placebo and thirty group B patients received 20 ml of 0.25% bupivacaine. All patients were pre-medicated with glycopyrrolate 0.2mg IM and ondansetron 4 mg IV half an hour prior to induction of anesthesia. All patients were given standard general anaesthesia with propofol (2-2.5 mg/kg), fentanyl 2 µg/kg, and succinylcholine (1.5 mg/kg) to facilitate tracheal intubation. Anesthesia was maintained with 50% N2O in oxygen with 2% sevoflurane. Results: The age and sex distribution of both groups were similar. The heart rate, systolic & diastolic blood pressure, mean blood pressure and mean trend of SpO2 in both groups remained similar over the periods. The mean Visual Analog Score in both groups varied considerably. It was higher in group A at 0 min, 30 minutes, 1 hour, 2 hour, 3 hour, 6 hour and 9 hour after surgery as compared to group B where, at 12 hr and 24 hrs scores were comparable. Time required for rescue analgesia was more in Group B as compared to Group A. Frequency of rescue analgesia and mean number of rescue analgesia doses were more in Group A as compared to Group B. Conclusion: We conclude that intraperitoneal instillation of local anaesthetic is an easy, cheap, and non-invasive method that provides good analgesia in the postoperative period after laparoscopic surgeries.

**KEYWORDS:** Intraperitoneal Bupivacaine, laparoscopic cholecystectomy, general anaesthesia.

## INTRODUCTION

Fifteen years after Muehe first did laparoscopic cholecystectomy, minimally invasive surgery has become the most preferred approach for treatment of symptomatic cholecystolithiasis. Laparoscopy is endoscopic visualization of intra-abdominal contents after insufflations of peritoneal cavity by using gas. Different types of abdominal surgeries are done laparoscopically by using two or more ports which produce surgical trauma and moderate to severe pain. Intraperitoneal insufflation of gas like carbon dioxide stretches the abdominal tissues, causes traumatic vessel tear, nerve traction and release of inflammatory mediators causing perioperative pain. Pain may be visceral or somatic, upper abdominal, lower abdominal or in shoulders as well.Postoperative pain may be transient and most of the time lasts for 24 hours and sometimes even up to 3 days. Intensity of pain is more immediately after surgery and less after 24 hours. There are certain more complications like postoperative nausea and vomiting which are more in first 24 hours. This pain can be reduced by the use of local anaesthetics, non steroidal anti inflammatory drugs and other analgesics as well.[1-5] Local anaesthetics can be given as epidural, intraperitoneal or as infiltration around the laparoscopic port sites before and after surgery.

## MATERIAL AND METHODS

The study is carried out in tertiary care centre of central India. The study is a prospective cross sectional comparative study done over a def inite period of time over sixty patients posted for Laproscopic cholycystectomy as elective procedure . The study includes sixty patients of age group 20 yr to 50 yr of ASA grade 1 and ASA grade 2. A detailed pre anaesthetic evaluation was done and patients were made familiar with the 10 point visual analogue scale with 0 as no pain, 1-3 as mild pain, 4 -7 as moderate pain, and 8-10 as severe pain.

Level of pain was assessed using the 10 point VAS Score at 15 min, 30 min, 1, 2, 3, 6, 9, 12 and 24 hours after surgery.The patients were randomly assigned to either of the groups to receive 20 ml of normal saline (group A) or 20ml of 0.25% bupivacaine intraperitoneally (group B) at the end of surgery in the trendlenberg position. The observer was blinded to the solution instilled. After getting the written informed consent, patients were pre medicated with inj. glycopyrollate 0.2mg im, inj.ondansetron 4mg IV half hour before surgery. The induction protocol was standard for all patients and consisted of intravenous administration of fentanyl (2 µg/kg), propofol (2-

2.5mg/kg), and succinylcholine (1.5 mg/kg) to facilitate tracheal intubation. Anesthesia was maintained with a mixture of 50% nitrous oxide and 50% oxygen with sevoflurane 2% and atracurium 0.1mg/kg. Ventilation (tidal volume 8-10 mg/kg) was adjusted to maintain end-tidal carbon dioxide between 35 and 40 mmHg. Intraabdominal pressure was maintained between 12 and 14 mmHg. Intraoperative monitoring consisted of ECG, non invasive BP, end tidal CO2, pulse oximetry and intraabdominal pressure. At the end of surgery group A patients received 20 ml of 0.9% normal saline as placebo and group B patients received 20 ml of 0.25% Bupivacaine solution which was sprayed on the upper surface of the liver and on right sub diaphragmatic space, to allow it to diffuse into the hepatodiaphragmatic space, near and above the hepatoduodenal ligament and above gall bladder. Anesthesia was discontinued and neuromuscular blockade was reversed with inj. Neostigmine (0.05 mg/kg) and inj. Glycopyrrolate (0.004 mg/kg). Patients were extubated and shifted to the postanesthesia care unit. Postoperatively the patients were assessed for pain utilizing visual analogue scale (VAS), shoulder pain and the number of analgesic doses required. The above parameters were assessed at 0min, 30min, 1hr, 2hr, 3hr, 6hr, 9hr, 12hr and 24 hrs. Rescue analgesic consisted of Inj Diclofenac 75 mg IM, utilized when the VAS was more than 4. The blood pressure, heart rate and respiratory rate were also assessed at the above times. Data analysis was done using word excel and MINITAB version 17. Independent samples T test and Chi-square test were used for inter-group comparison. Results were reported as mean ± standard deviation. The p value of <0.05 was taken as statistically signifi cant difference between the two groups.

## RESULTS

The two groups were comparable for age weight, height and sex. The vital parameters like heart rat e, blood pressure were comparable between the groups as is evident in table 1.

The VAS was higher in group A as compared to group B at 0 min, 30 min, 1 hr, 2 hr, 3 hr, 6 hr, and 9 hr with P<0.001. This difference was statistically significant (table 2). At 12th and 24th hour the VAS was comparable between the two groups.

In Group A all the patients needed rescue analgesia while 20 patients in Group B asked for rescue analgesia. The mean time for the first dose was 1.25hrs in Group A which was very less as compared to 5.23hrs in Group B, the difference was statistically significant with P<0.001. The mean total doses of analgesic were 3.2 in Group A as compared to 0.78 in Group B. The patients in Group B needed less than one rescue analgesic dose (table 3).

**Table 1: Mean age, weight, height, PR, and MAP in both the groups**

| Parameters | Group A | Group B | P value |
|---|---|---|---|
| Age (yrs) | 36.83 ± 7.65 | 36.60 ± 8.29 | P = 0.910 |
| Weight (kg) | 58.33 ± 6.77 | 60.60 ± 6.78 | P = 0.200 |
| Height (cm) | 166.3 ± 9.6 | 163.2 ± 8.6 | P = 0.1 |
| PR(beats/min) | 79.27 ± 8.25 | 78.17 ± 8.32 | P=0.609 |
| MAP(mmHg) | 89.77 ± 4.86 | 88.03 ± 6.83 | P=0.262 |

**Table 2: Visual Analogue Pain Score in Both Groups**

| | 0min | 30min | 1hr | 2hr | 3hr | 6hr | 9hr | 12hr | 24hr |
|---|---|---|---|---|---|---|---|---|---|
| Group A | 3.5±0.79 | 3.6±0.85 | 4.6.±0.6 | 4.5±0.7 | 4.6±0.8 | 3.6±0.6 | 4.4±0.8 | 3.6±0.12 | 4.6±0.8 |
| Group B | 2.1±0.64 | 2.3±0.45 | 2.3±0.79 | 2.4±0.1 | 2.4±0.24 | 2.3±.52 | 2.4±0.52 | 3.5±.52 | 4.3±0.2 |
| P value | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | >0.5 | >0.5 |

**Table 3: Analgesic Requirement**

| | No. of patients given rescue analgesia | Mean time for first dose (hr) | Mean total no. of doses |
|---|---|---|---|
| Group A | 30 (100%) | 1.25 | 3.2 |
| Group B | 20 ( 66% ) | 5.23 | 0.78 |
| P value | <0.0001 | 0.0001 | 0.0001 |

## DISCUSSION

Laparoscopic surgery offers potential advantages to the patients and hospital services. It reduces the hospital stay, expenses, and cosmetic disfigurement. Many of the previous studies have shown that postoperative pain from laparoscopy basically consists of either of the three components; visceral, parietal, and referred shoulder pain. The characteristic of pain component differs from each other in the intensity, latency and duration.[2] Various modalities have been proposed to relieve pain after laparoscopy surgery such as NSAIDS, opioids, local wound infiltration, intraperitoneal saline, and opioid.[3-5] Intraperitoneal instillation of 20 ml of 0.5% bupivacaine provides effective analgesia with plasma concentration of 0.92-1.14 µg/ml which is well below toxic levels. Several reports have shown that the route is

to block the visceral afferent signaling and modifying visceral nociception and thus the range of mean plasma concentration after intraperitoneal administration of plain bupivacaine 100-150 mg is below toxic concentration of 3 μg/ml.[1,5] Narchi *et al*. showed that intraperitoneal instillation of 100 mg of bupivacaine had no toxicity. This technique was found safe with good pain relief in initial few hours.[6]

The purpose of choosing the intraperitoneal bupivacaine was to provide analgesia. The mechani sm of action of local anesthetic in inhibiting pain is by affecting nerve membrane associated proteins and thus by inhibiting the release and action of prostaglandins and other agents that sensitize or stimulate the nocicepters and contribute to inflammati on.[4] Local anaesthetic is also absorbed from the peritonial surface and it is also mechanism of pain relief. Many studies failed to demonstrate the beneficial effect of intraperitoneal instillation of local anaesthetics in patients undergoing laparoscop ic cholecystectomy.[1,2,7-9] Rademaker et al used 20 ml of either 0.25% bupivacaine or 0.5% lignocaine, and he failed to demonstrate any reduction in postoperative pain. The failed effect of local anaesthetic instillation given by them was the small amount of local anaesthetics used as compared to Narchi et al. Instillation of local anaesthetics in the supine position prevented its flow to the coeliac plexus and phernic nerve endings. Joris et al studied the features of pain after laparoscopic cholecyste ctomy and the effect of intraperitoneal instillation of 80 ml of 0.125% bupivacaine with adrenaline.[2] They observed that the major discomfort experienced in early postoperative period is visceral pain whereas shoulder tip pain becomes the main complaint on the second day. They found that the intensity of shoulder pain in their study was less than the study of Narchi et al probably because of careful emptying of carbon dioxide pneumoperitoneum. Joris et al felt that several components contribute to existe nce of pain, and its relief depend on therapy for each of these components. Intraperitonial local anaesthetics when instilled in trendelenburg position attain sufficient concentration to block the nociceptive input from abdominal wall incisions. Scheinin e t al administered 100 ml of either 0.15% plain bupivacaine or with adrenaline in 200 head down tilt maintained for 20min to study the effect of positioning but they found no relief of pain after laparoscopic cholecystectomy.[8] Pasqulucci et al used 20 m l of 0.5% bupivacaine, and noted a decrease in pain and consumption of analgesics in their study. In our study pain relief was noted up to 9 hrs postoperatively whereas this was seen upto 24 hrs in Pasqualucci's and 8hrs in Neeraja Bharadwaj's study.[12] Pasqualucci et al also noted significant difference in analgesic consumption between the groups up to 24hrs which was similar as observed in our study.

## CONCLUSION

Intraperitoneal instillation of local anesthetic is an easy, cheap, and noninvasive method that provides good analgesia in the immediate postoperative period after laparoscopic surgery. In conclusion, intraperitoneal bupivacaine for laparoscopic cholecystectomy reduces pain in the initial postoperative period and it is easy to administer with no adverse effects.

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