



A COMPARATIVE STUDY OF EFFECTIVENESS OF INTRAPERITONEAL INSTILLATION OF BUPIVACAINE IN LAPAROSCOPIC CHOLECYSTECTOMY WITH AND WITHOUT ITS INSTILLATION IN POST-OPERATIVE PAIN MANAGEMENT

General Surgery

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ABSTRACT

Introduction: Laparoscopic cholecystectomy is a gold standard surgical procedure in post-operative pain recovery time. Though it is associated with lesser post-op pain than open cholecystectomy, few patients still experience pain. Pain relief is an important goal of any surgery. Administration of local anaesthetic either during surgery is a method of reducing post-op pain. **Aim:** To Compare the effect of intraperitoneal instillation of 0.5% bupivacaine with adrenaline and without intraperitoneal instillation of 0.5% bupivacaine with adrenaline for post-operative analgesia in laparoscopic cholecystectomy. **Materials & Methods:** A total of 120 participants were considered for this study with 60 participant receiving bupivacaine and other 60 receiving normal saline. VAS/VRS score is measured at 2, 4, 6, 12 & 24 hours after surgery for each group. **Results:** From the results, we found significant differences in the mean scores of study group and placebo group. The patients who were given bupivacaine were found to have reduced pain. **Conclusion:** In our study, we found that bupivacaine reduces postoperative pain. We conclude that the intraperitoneal instillation of bupivacaine is a safe and effective method for providing postoperative analgesia without significant side effects.

KEYWORDS

Laparoscopic cholecystectomy, bupivacaine

INTRODUCTION

Laparoscopic cholecystectomy is relatively beneficial over open cholecystectomy in pain controlling with reduced time of stay in hospital. In surgical patients, pain management is very important, though understanding of pain pathophysiology, pharmacology and other effective techniques are in progress.¹

The control of pain will reduce the complications after surgery and enhance faster patient mobilization, thus reducing the length of hospital stay and also the health care costs.^{2,3}

Perioperative analgesia with opioid analgesics is the traditional approach but the extensive use of opioids leads to perioperative side effects like nausea, drowsiness, depression and vomiting. Hence, anaesthesiologist and surgeons are gradually turning towards non-conventional techniques as alternatives for pain management to reduce the complications of analgesic medications.⁴

The combination of general anaesthesia and intraperitoneal instillation of local anaesthesia has been studied in various interventional investigations during laparoscopic cholecystectomy and almost 90% of the studies exhibited reduction in pain after postoperative surgery. The pathophysiology of pain is evaluated and one can prevent it by blocking the nociceptors before their stimulation by use of local anaesthetics. Bupivacaine belongs to such local anaesthetic that own safety profile with lesser side effects like gastritis because of Non-steroidal anti-inflammatory drugs (NSAIDs) or nausea.⁵

Postoperative pain is decreased after infiltration of local anaesthetics into operative wound in most of the patients undergoing herniorrhaphy and gynaecological procedures. Other studies reported that postoperative catheter infusion of bupivacaine decreased atelectasis and narcotic usage during open cholecystectomy.^{6,7}

Earlier reports on postoperative pain management and various beneficial activities of the intraperitoneal application of bupivacaine with morphine after laparoscopic cholecystectomy.⁸

All the observed studies showed that bupivacaine is the ideal anaesthetic used for regional blocks and duration of action ranges from 3-8 hours. The safety of using bupivacaine for analgesics is huge. Early

postoperative period is highly important for pain relief and patient comfort and hence need for analgesic may suspend discharge.⁹

Therefore our aim of the study is to evaluate the effect of intraperitoneal instillation of bupivacaine in laparoscopic cholecystectomy with and without its instillation in post-operative pain management.

MATERIAL AND METHODS

This study was conducted in Aarupadai Veedu Medical College and Hospital, Vinayaka Mission Research Foundation Deemed to be University, Pondicherry in Department of General Surgery.

After getting Institutional Ethical committee clearance, the study was conducted by obtaining proper consent from the study participants. Consent was obtained by explaining the purpose of study. All adult patients of American Society of Anaesthesiologists (ASA)-1 and 2 in the age group of 1 to 60 years of both sexes scheduled for laparoscopic cholecystectomy. The exclusion criteria that are used for patient selection were patients less than 18 years of age, patients with chronic pain syndrome, allergy to protocol drug, patients refusal, history of previous abdominal surgery, obese, patients in whom conversion to open cholecystectomy is done for any reason.

All patients posted for elective laparoscopic cholecystectomy surgeries were admitted a day prior to surgery. A detailed history including the identification detail of the patient, presenting complaints, was obtained. General Examination and detailed clinical examination was done. All necessary fitness were made & anaesthetist fitness was obtained. The operative site was cleaned/shaved with aseptic precaution. Intraperitoneal instillation of bupivacaine was given as per group division. All patients were asked to take body wash with soap on the day of surgery and the operative site was covered with a sterile dressing. Asepsis was maintained, and checklists were verified. Standard surgical scrub was mandatorily followed by the surgical team. Patients were randomly divided into 2 groups namely group A - patients received 20 ml 0.5% bupivacaine with 1 in 2 lakh adrenaline intraperitoneally at gall bladder bed and under right hemi diaphragm at the end of surgery through laparoscope port in Trendelenburg position whereas Group B patients received 20ml normal saline intraperitoneally at the same location. After surgery data was entered

on a Performa including VAS/VRS pain scale at 2 hours, 4 hours, 6 hours, 12 hours and 24 hours after surgery. Data was statistically compared.

Statistical Analysis

All the data were collected in proforma and entered in excel sheet. The collected data demographic data was summarized as frequency, percentage, mean and standard deviation. The summarised data were represented using tables, figures, bar diagram and pie charts. The mean difference between the continuous data was analysed using t-test, for follow-up data paired t-test and for categorical data Chi-square test was used to determine the significance between the parameters observed in this study. $P < 0.05$ was accepted as significant. Statistical analysis was performed using SPSS version 22.0 (IBM SPSS, US) software operating on windows 10.

RESULTS

A total of 120 cases included in the study out of which 60 patients who underwent laparoscopic cholecystectomy followed by Bupivacaine instillation and 60 patients who underwent laparoscopic cholecystectomy as control subjects were included. Group A = receives intraperitoneal instillation of 0.5% bupivacaine with adrenaline and group B = receives 20ml of normal saline. The overall mean age of all the patients included in the study was found to be 56 ± 7.48 yrs of age in group A and 33.3 ± 5.77 yrs of age in group B.

Table 1: Comparison of pulse rate between the groups

Pulse Rate	Group A n=Mean+ SD	Group B n=Mean+ SD	P Value
0 Hours	80.21+9.24	79.2+7.01	0.25
2 Hours	79.4+7.12	81.2+9.48	0.12
6 Hours	82.2+9.54	78.5+6.85	0.008*
12 Hours	80.2+9.12	79.2+7.01	0.25
24 Hours	78.2+6.82	80.34+9.32	0.77

Table 2: Comparison of systolic blood pressure between the groups

Systolic Blood Pressure	Group A n=Mean+SD	Group B n=Mean+SD	P value
0 Hours	125+8.2	126+8.2	0.25
2 Hours	123+8.05	125+8.2	0.91
6 Hours	123+8.05	124+8.06	0.24
12 Hours	122+8.02	124+8.06	0.088
24 Hours	121+8	124+8.06	0.21*

Table 3: Comparison of diastolic blood pressure between the groups

Diastolic blood pressure	Group A n=Mean+SD	Group B n=Mean+SD	P value
0 Hours	80+5.24	82.2+5.39	0.01*
2 Hours	78.2+5.03	80+5.24	0.02*
6 Hours	80.2+5.26	81.9+5.27	0.02*
12 Hours	78.7+5.06	83.2+5.32	<0.001*
24 Hours	80.2+5.25	83.2+5.32	0.00*

Table 4: Visual Analogue Score (VAS) significance between the groups

Visual Analogue Score	Group A n=Mean+D	Group B n=Mean+SD	P value
2 Hours	3.1+0.2	3.23+0.22	0
4 Hours	3.2+0.21	3.23+0.22	0.2
6 Hours	3.17+0.2	3.17+0.2	0.5
12 Hours	2.9+0.19	3.21+0.2	<0.001
24 Hours	2.5+0.17	3.22+0.2	<0.001

Table 5: Verbal Response Score (VRS) significance between the groups

Verbal Response Score (VRS)	Group A n=Mean+D	Group B n=Mean+SD	P value
2 Hours	1.2+0.07	2.5+0.17	<0.001
4 Hours	1.2+0.07	2.4+0.07	<0.00001
6 Hours	1.1+0.06	2.8+0.17	<0.00001
12 Hours	1.1+0.06	3+0.18	<0.00001
24 Hours	1+0.05	3.1+0.18	<0.00001

DISCUSSION

Laparoscopic cholecystectomy reduces the post-operative pain than

open cholecystectomy with less intense pain. The site of pain after laparoscopic cholecystectomy has various components like incisional, visceral and shoulder pain. The intensity of the pain on the day of surgery and declines within 2-3 days.^{9,10}

The intraperitoneal dissection and insufflation of CO₂ leading to abdominal wall and prolonged elevation of diaphragm causing visceral pain and tip shoulder pain.¹¹

The visceral pain is dull, whereas the parietal pain is superficial and can block receptors before nociceptive stimulation eliminates the onset of pain. Blocking of intraperitoneal infiltration can reduce visceral pain theoretically. Parietal pain can be minimized by portside infiltration.¹²

In the present study, all the demographic variables are noted and statistical significance was noted. The pulse rate of the group A individuals who are treated with Bupivacaine showed significant difference at 6 hours of post-operative measurement with $p=0.008$. Although there are vast variations in the pain scores, the differences in mean pain scores between the study and placebo during the initial 12 and 24 hours was found to be statistically significant with p value 0.001.¹²

However, we estimated the effect of local anaesthetic to wear off after the duration of 12-24 hours, pain scores were not increased after 6 hours postoperatively in the patients who received bupivacaine. For the placebo group pain score was rapidly higher than the study group postoperatively. Therefore, the significant effect of bupivacaine in this study might have been in amelioration of pain peak occurring after the surgery.¹³

Post-operative pain and need for additional analgesics in gynaecological laparoscopic surgeries can be reduced by the intraperitoneal bupivacaine. The application of local anaesthetics reduces the post-operative pain and analgesic requirements after laparoscopic fundoplication better than herniorrhaphy which was studied by the effect of preemptive and post-operative application of local anaesthetics in surgery. Few other studies showed that local anaesthetics instillation has failed to show effectiveness. This is because of the use of lower dosage and concentrations or due to the entire dose was instilled under right hemi diaphragm.¹⁴

As for the observation there was reduced shoulder pain in both groups. Studies showed that results given by Pasqualucci et al. presented a statistically significant effect on the surgical metabolic endocrine response and on pain scores on post-operative pain scores by instillation of bupivacaine 100mg after creation of pneumoperitoneum and 200 mg end of the surgery.¹⁵

Local anaesthetics are correlated with toxicity which is dose related. Therefore, the amount of use of local anaesthetics are significant. The toxic plasma concentration was not resulted in intraperitoneal instillation of 100mg of bupivacaine and also 300mg. The maximal tolerance rate before manifestation of central nervous system toxicity is 12% to 25%. On the basis of the studies conducted with 200mg of bupivacaine, toxicity was not found.¹⁵

Our study revealed statistically significant effect of intraperitoneal bupivacaine instillation in postoperative pain when compared to control group without treatment.

CONCLUSION

To conclude, the results of the study were found to be significant by the use of bupivacaine in preventing pain after laparoscopic cholecystectomy. Intraperitoneal instillation of bupivacaine had significantly decreased the postoperative pain in laparoscopic cholecystectomy.

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