



EVALUATION OF POSTOPERATIVE PAIN RELIEF WITH INTRAPERITONEAL BUPIVACAINE INSTILLATION IN LAPAROSCOPIC CHOLECYSTECTOMY.

General Surgery

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ABSTRACT

Background: Laparoscopic cholecystectomy is the surgical procedure of choice for cholelithiasis due to the improved postoperative course, but patients undergoing laparoscopic cholecystectomy during the first 24 hours postoperatively complaints of pain. This study was designed to study the efficacy of intraperitoneal Bupivacaine in reducing the initial postoperative pain and also to evaluate the postoperative shoulder tip pain and nausea and vomiting

Methods: Patients undergoing laparoscopic cholecystectomy were enrolled in study and received intraperitoneal Bupivacaine 100 mg at the end of the procedure and the control group received intraperitoneal saline. Post operatively patients were assessed for pulse rate, blood pressure, VAS, VRS, shoulder pain and nausea and vomiting at 0, 2, 6 and 24 hours.

Results: Among the 100 patients studied, our study proved that there is no statistically significant reduction in pain with intraperitoneal Bupivacaine. The VAS and VAR Score were calculated at 0, 1, 2, 6, 12 and 24 hours calculated.

Conclusion: We conclude that bupivacaine is effective at preventing pain after laparoscopic cholecystectomy.

KEYWORDS

Laparoscopic cholecystectomy, post-operative pain relief, local anesthetics.

INTRODUCTION:

With the expanding role of ambulatory surgery and the need to facilitate an earlier hospital discharge, improving postoperative pain control has become an increasingly important issue for all surgeons and anaesthesiologist¹. In common with all other types of pain, acute postoperative pain is an extraordinarily complex sensation which may be described as an interpretation of these signals by higher centers involving memory experiences of painful situation, and an affective component which generally comprises anxiety and /or depression. Uncontrolled postoperative pain has an adverse sequel of delayed resumption of normal pulmonary function, restriction of mobility (thus contributing to thromboembolic complications), nausea and vomiting, increase in the systemic vascular resistance, cardiac work, and myocardial oxygen consumption through an increase in the catecholamine release induced by the stress response². Adequacy of postoperative pain control is one of the most important factors in determining when a patient can be safely discharged from surgical facility and has a major influence on the patient's ability to resume their normal activities of daily living³. Control of acute postoperative pain and the timing, and duration (e.g., preemptive analgesia), is important in facilitating short and long-term patient convalescence⁴. Perioperative analgesia has traditionally been provided by opioid analgesics. However, extensive use of opioids is associated with a variety of perioperative side effects, such as ventilatory depression, drowsiness and sedation, postoperative nausea and vomiting, pruritus, urinary retention, ileus and constipation, thus can delay hospital discharge. In addition, it has been suggested by the Joint Commission on Accreditation of Health Organizations that excessive use of postoperative opioids analgesics leads to decrease patient satisfaction⁵. In addition the use of conventional method of administration of intramuscular opioids in standard prescribed doses, may be too large (causing side effects), or too small (causing inadequate analgesia). Therefore, anesthesiologist and surgeons are increasingly turning to non-conventional techniques as adjuvant for managing pain during perioperative period to minimize the adverse effects of analgesic medications⁶. From the non-conventional methods, the infiltration of long-acting local anaesthetics as an adjuvant for regional or local anaesthetic techniques, improve postoperative pain management, furthermore, when administered before surgery, these simple techniques can also decrease anaesthetic and analgesic

requirement during surgery as well as reduce the need for opioid containing analgesic postoperatively⁶. Intraperitoneal instillation of local anaesthetic in combination with general anaesthesia has been investigated in several interventional studies during laparoscopic cholecystectomy. Approximately half of these studies showed reduction in the postoperative pain significantly. In spite of several advantages of laparoscopic procedures over laparotomy it does not take away the disadvantage like the post-operative pain which results in an unpleasant experience for the patient and thereby delay the discharge. Pain usually occurs on the first day following surgery and it may be a visceral, parietal or shoulder pain⁷. By evaluating the pathophysiology of pain, it is shown that we can prevent or reduce pain by blocking the nociceptors before their stimulation by use of local anaesthetics⁸. Bupivacaine is one such local anaesthetic which has a good safety profile, is long acting and free of side effects like gastritis due to NSAID's or nausea and vomiting and fear of drug dependence as in opioids. Pain on the day of surgery is typically a diffuse abdominal pain, a more so to the right upper quadrant and right shoulder tip. The cause of this pain is thought to be related to abdominal muscle distension during laparoscopic procedure, irritative effects of residual carbon dioxide in the abdominal cavity and prolonged elevation of diaphragm by pneumoperitoneum. Decrease in postoperative pain after infiltration of local anaesthetics into the operative wound have been observed among patients who undergo herniorrhaphy and gynecological procedures^{9,10}. Postoperative catheter infusion of bupivacaine into the subcostal incision during open cholecystectomy has been shown to decrease atelectasis, and reduce narcotic usage¹¹. Continuous postoperative infusion of local anaesthetic agent into the abdominal wounds has reduced both postoperative pain and narcotic requirements^{12,13}. Bupivacaine has a half-life of 2.5 to 3.5 hours and has been reported to provide pain control for an average of 6 hours¹⁴. The margin of safety of the bupivacaine needed for analgesia is wide. Thus, pain relief and patient comfort during the early postoperative period becomes increasingly important, as the need for analgesic may delay discharge. Several studies have described pain according to the presumed mechanism: visceral pain, which can theoretically be blocked by intraperitoneal instillation, and parietal pain, which can be blocked by port site infiltration^{10,12,13}. Our study is designed to evaluate the effect of intraperitoneal instillation of 0.5% bupivacaine with adrenaline for

pain relief following laparoscopic cholecystectomy.

MATERIALS & METHODS:

SOURCE OF DATA:

100 adult patients were enrolled in study. All the patients were explained about the basis of the study and detailed history and informed and written consent were obtained.

INCLUSION CRITERIA

All adult patients of ASA-I and 2 in the age group of 18 to 60 years of both sexes scheduled for laparoscopic cholecystectomy.

EXCLUSION CRITERIA

1. Patients refusal
2. ASA grade III and IV.
3. Patients with chronic pain syndrome
4. Patients in whom conversion to open cholecystectomy is done for any reason.

Enrolled patients were explained about the use of visual analogue scale and visual rating scale for employed in this study. 100 adult patients of either sex between age group 18 to 60 years of ASA-I and ASA-2 undergoing elective laparoscopic surgery were enrolled. All patients received alprazolam 0.5mg orally and ranitidine 150mg orally night before surgery. All patients underwent similar general anaesthetic procedure.

General anaesthesia was induced using 2-3 mgkg⁻¹ Propofol 1ugkg⁻¹ fentanyl¹, and the trachea was intubated after succinylcholine 2 mgkg⁻¹ was taken effect. A nasogastric tube was introduced and the patient was placed in a head up position in order to provide optimum conditions for laparoscopic surgery. General anaesthesia was maintained by controlled mechanical ventilation with a Isoflurane and oxygen/nitrous oxide mixture (50%/50%). The mechanical ventilation was set to maintain the PaCO₂ between 32 and 40 mmHg depending on the different stages of laparoscopy. Muscle relaxation was maintained with vecuronium 0.08 mgkg⁻¹ initially and repeated every 20 minutes thereafter. The neuromuscular blockade was antagonized systematically with neostigmine 0.05mgkg⁻¹ and glycopyrrolate 0.01mgkg⁻¹. Monitoring consisted of electrocardiography, pulse oximetry, end-tidal capnography, and noninvasive blood pressure. Blood pressure measurements were made at 5 minutes intervals. The laparoscopic procedure was done in standard fashion. The peritoneal cavity was inflated using a CO₂ pneumofluter at an intraperitoneal pressure of 14 mmHg. Patients received preoperative intraperitoneal and sub diaphragmatic 0.5% bupivacaine with 1 in 2lakh adrenaline (10+10 ml) at the end of surgery before the trochars were withdrawn; a total of 100 mg, after instillation patient was maintained in trendelburg position for 5minutes for the drug to stay at the injected site. The residual CO₂ was evacuated carefully at the end of surgery by manual compression of the abdomen with open trochars. The nasogastric tube was removed after recovery from anaesthesia. Post operatively the patients were assessed for pain utilizing visual analogue scale (VAS) and verbal rating Prince Henry scale (VRS). The time of arrival in the postoperative ward was defined as zero hour postoperatively. Pain intensity was measured at fixed time interval. The patients were also enquired about nausea -vomiting, number of times and dose of rescue analgesia using a predesigned proforma, which were assessed at 2, 4, 6, and 24 hours.

VAS - visual analogue scale consists of a 10 cm scale representing varying intensity of pain from 0 (no pain) to 10 (worst pain).

VRS- Verbal rating scale has up to 4 grades

- 0 - No pain on cough
- 1 - Pain on cough but not on deep breathing
- 2 - Pain on deep breathing but not on rest.
- 3 - Pain at rest- slight.
- 4 - Pain at rest - severe.

Rescue analgesics Inj Tramadol 50 mg i.v, was given when VAS was more than 6 or VRS was more than 3 postoperatively, which was given by the ward nursing staff who were unaware of the nature of the intraoperative analgesia. The time from the end of surgery until the first requested analgesia was recorded, and the doses of postoperative

analgesia for breakthrough pain was assessed. Pain assessment was done by the investigator. The occurrence of nausea and/or vomiting was assessed by the ward nurses. If patients experienced nausea or vomiting, metoclopramide (0.1 mgkg⁻¹) was given. Patients were deemed ready for discharge from the hospital when they were afebrile, oral nutrition was tolerated without discomfort and bowel function (defined as presence of good intestinal sound or first passage of flatus) had returned.

RESULTS AND DISCUSSION:

Although Minimal Invasive Surgery is characterized by reduced pain, it is not painless. Patients undergoing laparoscopic cholecystectomy suffer considerable pain on the day of surgery frequently requiring narcotic analgesia.

Pain after laparoscopic cholecystectomy comprises of several components¹⁵. The parietal pain is due to placement of trocars through the abdominal wall. The visceral pain is because of intraperitoneal dissection and insufflation of CO₂ resulting in distension of abdominal wall and prolonged elevation of diaphragm leads to shoulder tip pain^{16,17,18}.

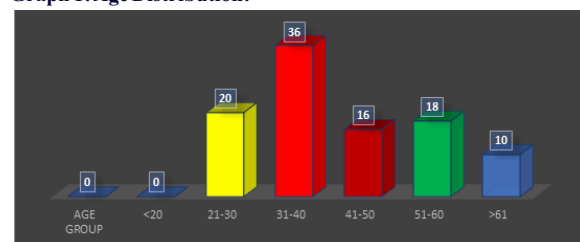
The parietal pain is superficial and can be located by the patient on the other hand visceral pain is dull, more diffuse in nature and difficult to locate. Studies show that blocking receptors before nociceptive stimulation eliminates the onset of pain. Visceral pain can theoretically be blocked by intraperitoneal infiltration; and parietal pain can be blocked by portside infiltration^{19,20}.

1. Age Distribution:

Table: 1 Age Distribution:

AGE GROUP	NO. OF PATIENTS
<20	0
21-30	20
31-40	36
41-50	16
51-60	18
>61	10

Graph 1: Age Distribution:



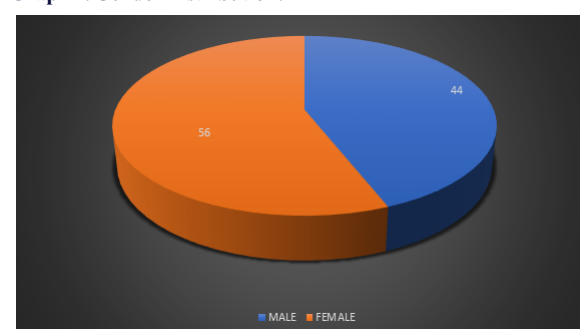
Most of the patient belonged to age group 31-40 which is comparable to study by Maharaul et al²¹ and Karthik et al²²

2. Gender Distribution:

Table 2: Gender Distribution:

Gender Distribution	Male	Female
Patients	44	56

Graph 2: Gender Distribution:



Female predominance was found in present study as well as study by Maharaul et al²¹ and Mudgal M M et al²³.

3. VAS Score and VAR Score:

Table 3. VAS Score:

VAS Score	Mean±SD
0 hour	2.5±0.21
1 hour	2.32±1.56
2 hour	2.57±1.57
6 hour	3.52±2.81
12 hour	3.69±2.87
24 hour	4.5±2.21

Table 4. VAR Score:

VRS Score	Mean±SD
0 hour	1.31±1.27
1 hour	1.57±0.78
2 hour	1.56±1.25
6 hour	3.13±0.57
12 hour	3.22±1.45
24 hour	4.37±1.09

Our study was done to know analgesic efficacy of intraperitoneal bupivacaine as postoperative analgesia following laparoscopic cholecystectomy.

Mean pain scores in first 6 hours was less and increased after 6 hours which is due to wear-off effect of the local anesthetic.

Similar study done by Shalan H et al⁸ for laparoscopic pelvic surgery, found that pain score and analgesic dose required were lower in bupivacaine group.

Goldstein A et al compared intraperitoneal 0.5% bupivacaine, 0.75% ropivacaine and saline instillation for postoperative pain relief found that local anaesthetics gave significantly good pain relief with ropivacaine being better than bupivacaine in both analgesia and opioid sparing effect¹⁵.

Bhardwaj et al²⁴, conducted study in patients undergoing laparoscopic cholecystectomy. He instilled 20 ml 0.5% bupivacaine only at the end of surgery in the trendelenburg position. Post operatively they assessed for vital signs (heart rate, blood pressure and respiratory rate), pain scores (VAS, VRS and shoulder pain) and analgesic consumption. They found that it reduced post-operative cholecystectomy pain and analgesic consumption²⁴.

The efficacy of local anaesthetic instillation in pain control has been demonstrated in numerous other studies in laparoscopic cholecystectomy. Some used bupivacaine 0.25%²⁵ while others used 0.125% bupivacaine²⁶ and found a good post-operative pain relief. A systemic review and meta-analysis for the effect of intraperitoneal local anaesthetic in laparoscopic cholecystectomy was done and 12 out of 24 studies reported a significant improvement in pain during early post-operative period.²⁷ The results correlate well with the results claimed in our study.

CONCLUSION:

We conclude that bupivacaine is effective at preventing pain after laparoscopic cholecystectomy.

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