

Postoperative Pain After Laparoscopic Cholecystectomy: Role Of Port Site And Intra-Peritoneal Infiltration Of Injection Bupivacaine

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ABSTRACT

Objective: To study the analgesic role of port site and intra-peritoneal infiltration of injection bupivacaine following laparoscopic cholecystectomy. **Materials and Methods:** 60 patients undergoing laparoscopic cholecystectomy were randomized into two groups of 30 each. Group A (study group) received 40 ml of intraperitoneal injection of 0.25% bupivacaine and 20 ml of same concentration in 4 ports, 5 ml each at the end of surgery. Group B (control) received no treatment. Post operative patient monitoring and pain assessment was done by another Doctor blinded to the procedure using VAS score at 1,4,12 and 24 hours after surgery. Ketorolac

intramuscular was given as rescue analgesic when demanded by patient within first 24 hours.

Results: when VAS score was analyzed in the two groups, the study group had less scores compared to control group though it was statistically not significant ($p > 0.05$). The rescue analgesic requirement was significantly less in study group ($p < 0.00$). **Conclusion:** port site and intra-peritoneal injection of bupivacaine is effective in decreasing pain after laparoscopic cholecystectomy

Keywords: Postoperative pain, Laparoscopic cholecystectomy, Injection Bupivacaine

INTRODUCTION

Postoperative pain is variable in duration, intensity and character and is the main factor delaying discharge of patients undergoing day-care procedures including laparoscopy and hence adding to hospital cost. Even within the same type of procedure, pain after laparoscopic surgery may vary in quality and localization¹ and is reported in several trials to be incisional, intra-abdominal, or referred (shoulder tip). The etiology is complex, including damage to abdominal wall structures, the induction of visceral trauma and inflammation^{1,2} and peritoneal irritation because of CO₂ entrapment beneath the hemidiaphragms³. In several trials, attempts have been made to differentiate between the various pain qualities and localizations^{4,5}. However, the results and conclusions are difficult to interpret, with several authors also expressing difficulties in making this differentiation. 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. Optimal management has a potential for shortening of hospital stay and for speeding up of recovery.

The observation of peritoneal inflammation after CO₂ pneumoperitoneum provides a rationale for the use of non steroidal anti-inflammatory drugs (NSAIDs)⁶. However, treatment of postlaparoscopy pain with NSAIDs yields controversial results. Moreover, because of the pathophysiologic changes of renal blood flow induced by pneumoperitoneum, the safety of preoperative administration of NSAIDs may be questionable. Opioids and NSAIDs are generally used for management of postoperative pain after LC.

Peripheral use of local anesthetics (LA) for postoperative pain relief has become a routine practice in many open surgical procedures. Benefit of wound infiltration in open abdominal surgery appears promising after minor procedures, such as hernia repair; however, it is less beneficial in moderate to major procedures. Compared with open procedures, laparoscopic surgery, a minimally invasive technique, associated with reduced surgical trauma^{7,8}. Peripheral use of local anesthetics (LA) after laparoscopic surgery may provide clinically relevant postoperative pain relief in the early postoperative period. LA can have an analgesic effect lasting few hours. They have minimal sedative effects that can expedite the discharge of the

patient. Local agents can have an opioid sparing effects thus reducing the nausea and vomiting commonly encountered after general anesthesia (GA). In this way they may enable the patient to reach the criteria for early discharge from hospital. Administration of intraperitoneal LA, either during or after surgery, is used by many surgeons as a method of reducing postoperative pain. This technique was first evaluated in patients undergoing gynecological laparoscopic surgery. Its application in laparoscopic cholecystectomy (LC) was initially examined in a randomized trial in 1993. Since then, many trials evaluating the efficacy of intraperitoneal LA in LC have been published worldwide. Clinical value of infiltration of wounds with LA and their intraperitoneal application still remain controversial. Present study was conducted to evaluate the analgesic effect of bupivacaine after applying it at port site and in the peritoneal cavity into right upper abdomen.

PATIENTS AND METHODS

This is a prospective randomized study of 60 patients undergoing laparoscopic cholecystectomy (LC) from January 2009 to August 2009. We obtained the approval from the hospital ethical committee and got the informed consent from the patients for the following study.

Inclusion Criteria

Patients undergoing LC with ASA I & II were included in the study.

Exclusion Criteria

Patients with contraindications to NSAIDs (esophagogastroduodenal disease, renal insufficiency, abnormal coagulation), or with confirmed local anesthetic allergy were excluded, as were those whose pain evaluation was judged unreliable because of neurological disease or treatment by steroids, NSAIDs or opioids before surgery. Patients who received opioids or tranquilizers for more than one week prior to LC were not included. Lack of compliance in completing pain assessment was another reason for exclusion. Patients undergoing coincidental paraumbilical hernia repair were also excluded. Patients were excluded if the operation was converted from LC to open cholecystectomy. No patient had acute cholecystitis.

All patients received single dose of injection ceftriaxone (1gm) at the time of induction of anesthesia. Preoperative or postoperative sedation was given to any patient. All the patients received

similar type of standardized anesthetic regimen - induction with propofol, maintenance with isoflurane, relaxation with atracurium and reversal with neostigmine. During surgery, patients were positioned in the reverse trendelenberg position with the right side of the table elevated. The Abdomen was insufflated at supra-umbilical port with CO₂. During laparoscopy, intrabdominal pressure (IAP) was maintained at 12 mm Hg and at the end of surgery. The same two surgeons performed all operations. If necessary, a lateral Umbilical fascial incision was made to ease retraction of the gallbladder (1/2–1 cm). Intraoperative Cholangiography was not performed. CO₂ was removed by suction and manual compression of abdomen. All patients received injection diclofenac 50mg I/M thrice daily for day1 and then as and when required. LC was performed using standard 4 ports technique with two 10 mm and two 5 mm ports. Gall bladder was extracted through the epigastric port. Sealed envelopes were opened indicating group of patient at the end of surgery. The study group received 40 mls of 0.25% bupivacaine as intraperitoneal infiltration and local infiltration of 20 mls of 0.25% bupivacaine in the port sites (5 ml infiltration in each port). Intraperitoneal infiltration was under the right hemi diaphragmatic and gall bladder bed. The control group didn't receive any treatment. Intra operative monitoring included ECG, pulse oximetry, and non invasive blood pressure monitoring, which recorded systolic, diastolic and mean arterial blood pressure. Duration of surgery was also recorded in each patient. Visual analogue score (VAS) of 0-10 was explained to the patients during preoperative visit as below:

0-----no pain

1-3----- mild pain

4-7----- moderate pain

8-10----- severe pain

Level of pain was assessed using the 10 point VAS score at 1, 4, 12 and 24 hours after surgery. Rescue analgesic, ketorolac intramuscular, was given whenever patients complained of moderate to severe pain within first 24 hours of surgery. Data analysis was done using SPSS 17 statistical analysis programs. Independent sample t test and chi-square test were used for inter-group comparison. Results were reported as mean \pm standard deviation. The p value of <0.05 was taken as statistically significant difference between the two groups.

The patients and the investigators who collected the data were blinded to the patient's group.

RESULTS

Comparison of demographic parameters i.e. age and sex between the two groups was similar and there was no significant differences in the duration of surgery between the two groups (Table1).

Table 1:
Demographic parameters and duration of surgery in studied patients.

Parameters	control group	study group	P value
Age in years	21-59 (35.0±12.08)	22-70 (37.3±13.12)	0.547
Male: female	3:17	2:18	0.814
Duration, minutes	26-95 (66.25±25.89)	33-90 (74.4.25±22.20)	

Table 2:
Number of patients with different VAS scores (no pain, mild, moderate and severe pain) after 1, 4, 12 and 24 hours after surgery.

Pain score (VAS)	Control group / Study group				p Value
Severe (8,9,10)	14 /04	06/02	03/01	05/00	0.09
Moderate (4,5,6,7,8)	05/ 02	12/05	08/02	07/00	0.038
Mild (1,2,3)	11 /10	12/06	15/14	15/25	0.100
No pain (0)	00/14	00/17	04/13	03/05	0.160
Time after surgery(hours)	1	4	12	24	

Table 3:
Rescue analgesic requirements in first 24 hours after surgery.

Rescue analgesic	Control group (no. of patients)	Study group (no. of patients)	p Value
Not required	0 0(00%)	08(27%)	0.00
Once	30(100%)	21(70%)	0.00
Twice	25(83%)	06(20%)	0.00
Thrice	05(17%)	02(07%)	0.00

VAS scores at 1, 4, 12 and 24 hours after surgery were assessed in both the groups. Number of patients having mild, moderate and severe pain was higher in the control group in all assessed hours after surgery compared to those in the study group. Rescue analgesic requirement, which was given as intramuscular ketorolac, was also higher in the control group, which was significantly different ($p < 0.00$), (table 3). Rescue analgesic consumption in the first 24 hours after surgery was also significantly less in the study group, (70% patients demanding once, 20% twice, 07% three times and 27% didn't ask for ketorolac in 24 hours) compared to the control group where all patients asked for at least once, 83% two times and 17% three times (table 3). When patients having moderate to severe pain were analyzed four times in 24 hours, control group had more number of patients compared to study group. Number of patients having mild pain was also less and number of patients having no pain was absent in control group but most of the patients were pain free in early 12 hours after surgery in study group.

DISCUSSION

The use of local anesthetics directly instilled into the peritoneal cavity in laparoscopic hernia repair procedures and after cholecystectomy has been shown to reduce pain in the postoperative period. Maharjan SK and Shrestha S concluded in their study that infiltration of 0.25% bupivacaine in peritoneal cavity and around the ports used for surgery significantly reduces the severity of post-operative pain and the analgesic requirement in the postoperative period following laparoscopic surgeries⁹. Chundrigar et al report a decrease of postoperative pain 1-2 hours after laparoscopic cholecystectomy if 0.25% bupivacaine was used. However, analgesic consumption over 1st 24 hour was same in control study¹⁰. Lee, II-OK et al also reported similar effects with bupivacaine after laparoscopic cholecystectomy.¹¹ Lee ok et al had studied the portal and intraperitoneal bupivacaine infiltration before and after surgery. Incisional somatic pain dominated and incisional pain was lower in patients with preincisional periportal injection. Peritoneal infiltration didn't decrease visceral pain. They had recommended preincisional bupivacaine to

decrease somatic pain after surgery¹¹. Chu PT et al, reported that pain after laparoscopic surgery is generally mild and patients usually complain of diffuse abdominal pain, minor shoulder tip pain and pain in the incision site. Local surgical trauma can produce severe and deep-seated pain requiring narcotics, although NSAIDs are often sufficient. Infiltration of puncture sites with bupivacaine is useful¹². Johnson et al had performed two consecutive studies with intraperitoneal bupivacaine and periportal injection of bupivacaine after completion of surgery. They had reported that intraperitoneal bupivacaine is as effective as wound infiltration and the addition of NSAIDs makes no difference in decreasing post-operative pain after laparoscopic cholecystectomy¹³.

Alexander P et al in their article "The Effect of Intraperitoneal local Anesthesia in Laparoscopic Cholecystectomy: A Systematic Review and Meta-Analysis" concluded that the use of intraperitoneal local anesthesia is safe, and it results in a statistically significant reduction in early postoperative abdominal pain¹⁴. No adverse events related to local anesthetic toxicity were reported. Hernández-Palazón et al concluded that in patients undergoing laparoscopic cholecystectomy, the intraperitoneal administration of bupivacaine 0.25% reduced the analgesic requirements during the first 6 postoperative hours compared with the control group¹⁵.

In our study, we found that infiltration of 0.25% bupivacaine at port sites, under the right hemi diaphragm and gall bladder bed decreases the post operative pain in first 24 hours. It also significantly reduces the analgesic requirements in the postoperative period in first 24 hours.

CONCLUSION

Postoperative pain and rescue analgesic requirement after laparoscopic cholecystectomy can be reduced by port site and intra-peritoneal infiltration with injection bupivacaine 0.25%. It will translate into an earlier discharge of the patient from hospital and thus making it more cost effective for patient and state.

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