

Assessment of Pain Outcome and Amount of Analgesic Required Post Operatively After Instillation of Bupivacaine amongst Pre Incisional Vs. Postincisional Vs. Control Groups

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Abstract

Background: Effective postoperative pain control is an essential component for care of surgical patients. Although opioid analgesics are effective in treating postoperative pain, concerns regarding their ability to increase nausea, vomiting and to produce respiratory depression have limited their use during laparoscopic procedures. The study aimed to provide impetus for further research and help in performance of laparoscopic cholecystectomy as a day care procedure. **Subjects and Methods:** The present study was conducted on a group of 180 patients diagnosed to have symptomatic cholelithiasis and who underwent elective laparoscopic cholecystectomy. In one group, pre-incisional local infiltration of 20ml 0.5% bupivacaine at the port sites with intraperitoneal installation of 10ml 0.25% bupivacaine was done throughout all the layers of the abdominal wall (till peritoneum). In group 2, local infiltration of 20ml 0.5% bupivacaine at the port sites with intraperitoneal installation of 10ml 0.25% bupivacaine was done after the completion of surgical procedure, and just before the closure of skin. The analysis was done using one way ANOVA & Post HOC test (Scheffe's HSD) & Chi square tests. Parameters studied are side effects like nausea/vomiting and the additional need of rescue analgesia along with elapsed time for 1st rescue analgesia. **Results:** Our patients in both the study groups received the first analgesic drug much later (~6 hours postoperatively) as compared to the control group (2.3 hours post operatively). The total analgesic requirement post operatively was also lower in the study group with respect to the control group. (150 mg vs 300 mg of inj Diclofenac sodium) There was no significant difference in the incidence of shoulder tip pain amongst the three groups. 11 out of 180 patients in the study group experienced post-operative nausea while 6 out of 60 patients in the control group experienced nausea. **Conclusion:** To conclude, technique of instillation of bupivacaine at the port sites in laparoscopic cholecystectomy is simple, safe and without adverse effects. It is likely to be cost effective, because it decreases post-operative usage of NSAIDs or opioids, and helps in better resource utilization for treatment of postoperative pain and also useful for patient to provide a more comprehensive and comfortable post-operative period.

Keywords: Bupivacaine; Laparoscopic Cholecystectomy; Pre-Incisional Local Infiltration.

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Introduction

During last ten years postsurgical visceral pain and intense nociceptive somatic pain in immediate post-surgical period is considered as, the most important endocrinal and neurohumoral disorder. That period is therefore characterized by increased catabolism, increased secretion of stress hormones, increased stress of the cardiovascular system, lung function disorder, occurrence of hypercoagulability, fibrinolysis decline, immunological suppression, paralytic ileus and post-surgical nausea and vomiting.^[1]

One of the main cause of pain is trauma to the abdominal wall and visceral organs by surgical instruments. There is a linear inverse relationship between abdominal compliance and severity of postoperative pain at the time of

laparoscopy. Therefore, abdominal distention should better be done slowly with adequate muscle relaxation to ensure suitable abdominal compliance. Prolonged presence of shoulder tip pain suggests excitation of phrenic nerve, caused by persistence of gas in the abdomen after laparoscopic procedure. There is statistically significant correlation between the CO₂ pressure and pain score, and this pain can be reduced by the aspiration of the gas under the diaphragm.^[2]

Effective postoperative pain control is an essential component for care of surgical patients. Inadequate pain control may result in increased morbidity or mortality. Evidence suggests that surgery suppresses the immune system and this suppression is proportionate to invasiveness of the surgery. Good analgesia can reduce this deleterious effect. Data available indicate that afferent neural blockade

with local anesthetics is the most effective analgesic technique. Next in order of effectiveness are high-dose opioids, epidural opioids and clonidine, patient controlled analgesia, and nonsteroidal anti-inflammatory agents.^[3] Although opioid analgesics are effective in treating postoperative pain, concerns regarding their ability to increase nausea, vomiting and to produce respiratory depression have limited their use during laparoscopic procedures.^[4] Non-steroidal anti-inflammatory drugs (NSAID) block the synthesis of prostaglandins by inhibition of enzyme cyclo-oxygenase. In major surgery combination of NSAIDs and opioids provide better quality of analgesic as compared to opioid alone. Moreover, it has consistently been shown that NSAIDs given soon after major surgery reduces opioid requirements by about one third.^[5] There is dearth of studies on timing of giving the local anaesthetic agent, whether to give it before incision or to instill it just before closure of the port site wounds. The study aimed to provide impetus for further research and help in performance of laparoscopic cholecystectomy as a day care procedure.

Subjects and Methods

The present study was conducted on a group of 180 patients diagnosed to have symptomatic cholelithiasis and who underwent elective laparoscopic cholecystectomy under General Anaesthesia in Department of Surgery at Maharaja Agrasen Medical College, Agroha, Hisar. The whole procedure and risks involved were fully explained to the patient and well informed and written consent in vernacular language was taken. In group 1, pre-incisional local infiltration of 20ml 0.5% bupivacaine at the port sites with intraperitoneal installation of 10ml 0.25% bupivacaine was done throughout all the layers of the abdominal wall (till peritoneum). In group 2, local infiltration of 20ml 0.5% bupivacaine at the port sites with intraperitoneal installation of 10ml 0.25% bupivacaine was done after the completion of surgical procedure, and just before the closure of skin. Bupivacaine instillation in both groups 1 & 2 was allocated according to the diameter of the trocar; 7 ml for 10 mm port and 3 ml for 5 mm port and 10ml intraperitoneal over liver site. In group 3, no local infiltration was done and was treated as control group. The study was evaluated using Visual analog scale for period of 24 hours post-operatively. The analysis of our study was performed using statistical analysis tools, initially crosstabs procedure was performed followed by one way ANOVA & Post HOC test (Scheffe's HSD) & Chi square tests as and when indicated.

Inclusion criteria

Table 1: Mean duration of hospitalization

Group	N	Range	Duration (Hours) Mean±SD	ANOVA#	Comparison	P value#
Group 1	60	2-5	3.46±0.90	F=1.748; P= 0.179; NS	Group 1 vs 2	0.181NS
Group 2	60	2-5	3.58±1.06		Group 1 vs 3	0.352NS
Group 3	60	3-7	3.72±1.18		Group 2 vs3	0.917NS

p>0.05; Not significant; *p<0.05; Significant

All patients scheduled for undergoing laparoscopic cholecystectomy, with ultrasonography evidence with age ≥ 18 years and ASA class I or II.

Patients unwilling to participate, conversion of laparoscopic cholecystectomy into open cholecystectomy and patients who fail to understand the pain assessment tool were not included in the study. Following parameters were followed at different time intervals i.e. at 0 hrs, 30 mins, 4 hrs, 6hrs, 12 hrs & 24 hrs postoperatively and recorded in the proforma;

1. Intensity of pain during rest and during movement on bed.
2. Pulse Rate
3. Blood Pressure
4. Respiratory Rate
5. Temperature
6. Side effects like Nausea/ Vomiting
7. The additional need of rescue analgesia along with elapsed time for 1st rescue analgesia

Results

The mean duration of hospitalization amongst all the three groups was 3.58 days [Table 1]. Group 1 was 3.46 days, group 2 was 3.58 days and group 3 was 3.72 days. The mean range was 2 – 7days. There was no statistical difference in the mean duration of hospitalization amongst the three groups. (F=1.748, P=0.179).

The range for timing of giving first analgesic was between 0.5-24 hours in groups 1 & 2 and 0.5 – 18 Hours in group 3. In group 1 and 2 some of the patients need analgesia immediately after extubation though bupivacaine instillation was also done. The mean timing for giving first shot of analgesic was comparable in the preincisional & Pre closure group i.e. 5.83 & 4.55 hours respectively, however it was significantly early in the control group i.e. 2.66 hours (p<0.001) [Table 2, Figure 1]. Bupivacaine instillation at port site in both the groups significantly delays the time needed for giving the first analgesic dosage. The average amount of total analgesic used in the control group 3 was significantly higher compared to the other two groups 1 and 2 [Table 3, Figure 2]. But there was no significant difference among group 1 & 2 in terms of total number of analgesic dosages (p>0.05).

Postoperative shoulder tip pain was present in all three groups, 4 patients in the pre incisional group, 2 in the pre closure group & 6 patients in the control group complained of sholuder tip pain postoperatively [Table 4]. However chi square test yielded that the results were insignificant with p value = 0.392.

Table 2: Mean Time to give first analgesic

Group	N	Range	Time Mean±SD	ANOVA#	Comparison	P Value#
Group 1	60	0-24	5.63±6.36	F= 18-431; P <0.001**	Group 1 vs 2	0.977NS
Group 2	60	0-24	5.92±6.03		Group 1 vs 3	<0.001**
Group 3	60	0.5-18	2.34±4.15		Group 2 vs 3	<0.001**

p>0.05; Not significant; ** p<0.001; Highly Significant

Table 3: The total amount of average analgesic doses consumed. Total No. of diclofenac sodium doses (in multiples of 75 mg given IV)

Group	N	Range	Number of analgesics Mean±SD	ANOVA#	Comparison	P Value#
Group 1	60	0-5	2.36±1.198	F= 29.915 P <0.001**	Group 1 vs 2	0.148NS
Group 2	60	0-5	2.26±1.271		Group 1 vs 3	<0.001**
Group 3	60	2-6	4.26±1.086		Group 2 vs 3	<0.001**

p>0.05; Not significant; **p<0.001; Highly Significant

Table 4: Incidence of shoulder tip pain

Shoulder tip pain	Group 1	Group 2	Group 3
Present	5 (9.1%)	2(3.3%)	6(10%)
Absent	55 (90.9%)	58 (96.7%)	54(90%)

$\chi^2= 1.875$; df=2; p=0.392; Not Significant

Table 5: Incidence of postoperative Nausea

Nausea	Group 1	Group 2	Group 3
Present	2(3.33 %)	3(5%)	6 (10%)
Absent	58 (96.67%)	57[95%]	54 (90%)

$\chi^2=8.276$; df = 2; p=0.016 Significant

Table 6: Incidence of post-operative vomiting

Vomiting	Group 1	Group 2	Group 3
Present	0	0	2(3.33%)
Absent	60 (100%)	60 (100%)	58(97.67%)

Post-operative nausea was seen in 6 patients in the control group, 5 patients in preincisional and preclosure group [Table 5]. Hence, bupivacaine instillation post-operatively has significant effect on postoperative nausea. (p=0.016). None of the patient experience postoperative vomiting [Table 6]. No side effects were observed with the use of Bupivacaine in this study.

Discussion

In our study timing of local infiltration was found to be insignificant, i.e. similar pain scores were obtained with both preincisional and preclosure infiltration of bupivacaine. This is in contrast to study conducted by Sarac et al who demonstrated the optimum timing for giving local anaesthetic agent and concluded that local anesthesia infiltration of trocar sites following surgery offers better pain relief than local anesthetic given just before the incision.^[6]

The timing of giving first analgesic dosage in our study group was significantly less as compared to the control group, this is consistent with the studies carried out by Maharajan et al.^[7] We find an appreciable difference in total postoperative analgesic requirement between control group, bupivacaine group and it was consistent with the findings of Bisgaard et al.^[8]

In our study we found that instillation of bupivacaine at port sites did not have much effect on the post-operative stay. Paulson J et al,^[9] found that patients receiving bupivacaine at any time during the surgery were more likely to go home on the day of procedure (79% vs 43%, respectively: P < 0.02). Similarly, Yu-Yin Liu et al,^[10] indicated that infiltrating ropivacaine after surgery through the port site reduce pain intensity, number of patients requiring postoperative analgesics, and hospital stay. The LA group had a significantly shorter hospital stay than the control group (1.1±0.3 d vs 2.8 ±2.7 d, P= 0.001). Longer duration of hospitalization in our study can be attributed to other factors related to the surgery, i.e. all patients are inserted abdominal drains as a standard protocol & in our wards removal of the drain is done at the 2nd to 3rd day post operatively. However, individually some patients were discharged on the same day in both the study groups.

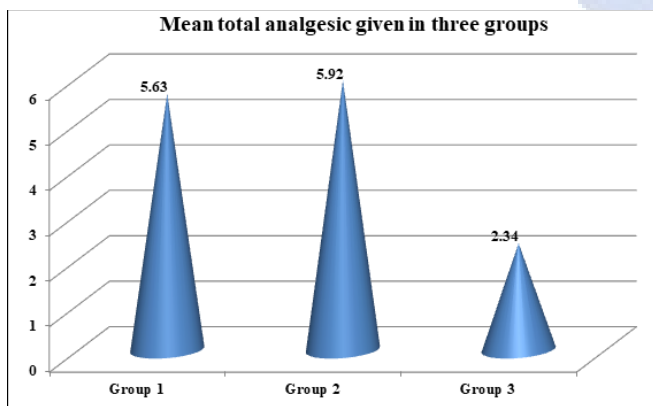


Figure 1: Mean timing for giving first analgesic (in hours)

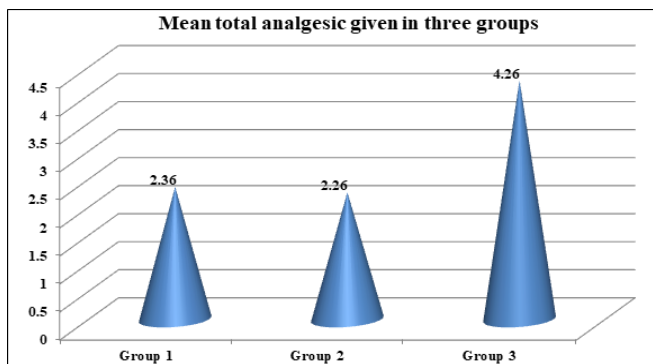


Figure 2: Total amount of average analgesic doses consumed

Postoperative shoulder tip pain was observed equally in all the three groups. There was no overall statistically significant difference in the occurrence of shoulder tip pain. Pavlidis et al,^[11] studied the effect of local anaesthetic ropivacaine at the trocar sites and obtained similar results with an unchanged incidence of shoulder tip pain. In our study we did not observe any side effects of bupivacaine which is in consistent with the study of Narchi et al,^[12] who also in their study found no signs of local anesthetic toxicity.

Conclusion

To conclude, instillation of bupivacaine at the port sites in laparoscopic cholecystectomy irrespective of the timing of instillation is an effective method of achieving pain control in the post-operative period as long as 24 hours after surgery. This technique is simple, safe and without adverse effects and local anesthetics should be considered for instillation in all patients at the beginning and at the end of laparoscopic procedures. It is likely to be cost effective, because it decreases post-operative usage of NSAIDs or opioids, and helps in better resource utilization for treatment of postoperative pain and also useful for patient to provide a more comprehensive and comfortable post-operative period.

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