Original Article

Postoperative Reduction of Opioids Using 0.5% Plain Bupivacaine through Port Sites at the End of Laparoscopic Cholecystectomy

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Abstract

***Background**: In present days, laparoscopic cholecystectomy is the gold standard technique for the treatment of gallstone diseases. Effective pain control is an essential component for the patients during postoperative period. **Objectives**: The aim of this study was to evaluate the effects of port site infiltration of local anesthetics (Inj. 0.5% bupivacaine) in reduction of pain and opioid usages during postoperative period following laparoscopic cholecystectomy. **Materials and Methods**: A randomized control trial prospective analytical study was conducted in the department of Anesthesiology of Enam Medical College & Hospital in Bangladesh. The patients subjected to laparoscopic cholecystectomy were the study population. Total 60 patients were selected and randomly allocated into two groups as "control group" and "study group". Study group assigned to receive 0.5% bupivacaine at port sites. The evaluation of postoperative pain was done according to the numeric pain rating scale. Data regarding percentage of analgesic consumed and duration of hospital stay were recorded and analyzed. **Results**: The mean age of the patients in control group was 44.26±15.56 years and in study group 38.50±12.87 years (p=0.20). Mean weight of the patients was 61.13±8.25 kg in control group and 59.33±8.27 kg in study group (p=0.09). Male female ratio in control group was 11:19 and 8:22 in study group. Mean pain score at 4 hours was significantly lower in the study group compared to control group. Additional analgesics were required 86% in control group and 47% in study group. The mean duration of hospital stay in control group and study group was 2.6 days and 1.6 days respectively. **Conclusion**: Infiltration of bupivacaine into port sites is simple, inexpensive, and effective technique to reduce postoperative pain and opioid requirements. It can be conventionally practiced for laparoscopic cholecystectomy operation.*

***Key words:** Postoperative pain reduction; 0.5% plain bupivacaine; Laparoscopic cholecystectomy; Local anesthetics*

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Introduction

Laparoscopic cholecystectomy is a popular and modern technique for treating gall stone diseases.[1,2] Laparoscopic procedures have many advantages such as minimal trauma, less bleeding, better cosmetic results, less expensive, early recovery, and shorter hospital stay which promotes early mobilization leading to better patient satisfaction.[1-4] However, postoperative pain is a burning issue for surgery which is conventionally treated using analgesics such as NSAIDs, opioids, and intraperitoneal local anesthetics.[5] Infiltration of local anesthetics (0.5% plain bupivacaine) can be administered at port sites of laparoscopic procedure to reduce postoperative pain.[6] It is very simple, easy, cheap and more effective technique to reduce postoperative pain after operation within the first 24−48 hours.[7,8] In addition, it does not cause additional central neuroaxial block.[9] When administered before or after surgery it can decrease analgesic requirement per-operatively as well as reduce the need for opioid-containing analgesic postoperatively.[10] This present randomized control trial is aimed at assessing the effects of port sites injection of 0.5% bupivacaine in reduction of postoperative pain after laparoscopic cholecystectomy.

Materials and Methods

This study was conducted in the department of Anesthesiology of Enam Medical College & Hospital between January 2018–December 2019. A total of 60 patients diagnosed to have cholelithiasis and who underwent laparoscopic cholecystectomy under general anesthesia were randomly selected by probability sampling technique. Patients were blinded but the investigators were not. Pre-anesthetic evaluation was done for all patients. After obtaining written informed consent from the patients and approval of the ethical committee, patients were randomly allocated into two groups: "control group" and "study group".

Inclusion and exclusion criteria

Patients of both sexes aged between 20−70 years of American Society of Anesthesiologists (ASA) status I, II were included in the study. Patients who were allergic to study drugs and above ASA-II status, patients with extensive intrabdominal manipulation in case of severe gall bladder infection, patients who had opium addiction or other drug abuse and patients in whom procedure was converted to open cholecystectomy were excluded from the study.

Control group consisted of 30 patients, among them 19 were female and 11 were male. The "study group" consisted of 30 patients, among which 22 were female and 8 were male. After surgery, their postoperative pain was managed using two different methods: the control group was treated with the conventional analgesics such as different types of opioids and NSAIDS and the study group was managed with local anesthetic drugs. In both groups injection fentenyl, ketorolac and tromethamine 30 mg was administered intravenously at the end of operation. For both groups number and size of the ports were similar. At the end of operation 0.5% plain bupivacaine 20 mL was infiltrated through the port sites in the "study group". After operation patients were transferred to the postoperative ward and were monitored by qualified, experienced nurse at fixed time interval to see the severity of pain. Assessment of pain was done using Numeric Pain Rating Scale in both groups. Further, requirement of opioid analgesic in both groups of patients were assessed. Duration of hospital stay was also analyzed. All the measures were recorded on a preformed record sheet. Data were collected and were analyzed by SPSS version 20.0. Results were expressed as mean ± standard deviation. Male and female ratio and the occurrence of port-site, abdominal and shoulder tip pain were expressed in percentages. Difference between the study group and control group regarding pain score and analgesic requirements postoperatively were analyzed by Chi Square test. A p value of less than 0.05 was considered statistically significant.

Results

Sixty patients were divided into two groups. The mean age of the patients in control group was 44.26±15.56 years and in study group 38.50±12.87 years (p=0.20). Mean weight of the patients was 61.13±8.25 kg in control group and 59.33±8.27 kg in study group (p=0.09). Male female ratio in control group was 11:19 and 8:22 in study group (Table I).

Table I: Demography of the patients

Patients' characteristics	Control group (n=30)	Study group (n=30)	p values
Mean age (years)	44.26±15.56	38.50±12.87	0.20
Mean weight (Kg)	61.13±8.25	59.33±8.27	0.09
Gender (M:F)	11:19	8: 22	

Table II: Mean Pain Scores for study and control groups postoperatively

Postoperative assessment time (hours)	Control group (n=30)	Study group (n=30)	p values
4	7.3±0.46	4.0±6.9	0.019*
8	7.7±1.05	4.80±0.71	0.174
12	4.16±0.79	2.9±0.80	0.081
24	3.66±1.02	1.4±0.68	0.06

Table III: Frequencies and Chi-square results of opioid analgesic requirement in both groups of patients

Groups	Additional analgesia requested		No additional analgesia requested		Chi-square (x^2)
	Frequency (n=30)	Percentage	Frequency (n=30)	Percentage	
Control group	26	86	4	14	4.038***
Study group	14	47	16	53	

***p =0.044, df=1

Intensity of pain was assessed at fixed time intervals at 4 hours, 8 hours, 12 hours, and 24 hours postoperatively using 'Numeric Pain Rating Scale' and they showed that there were a significant difference in the mean pain score at 4 hours postoperatively ($p<0.05$) while there was no significant difference at 8, and 12 hours postoperatively ($p>0.05$) as shown in Table II.

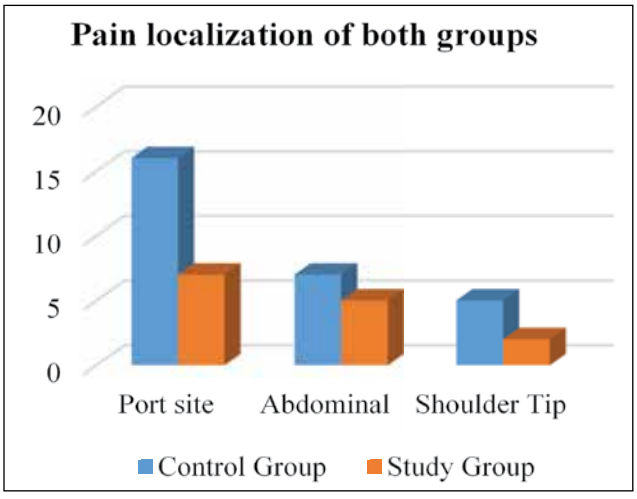

Fig 1. Incidence of pain localization between two groups

The dominant site of pain 4 hours postoperatively was at port site in both groups which was 53.3% (16) and 23.3% (7) in control and study group respectively followed by abdominal site which was 23.3% (7) and 16.6% (5) in control and study groups respectively. Least number of patients complained of shoulder tip pain in both groups which was 5 (16.6%) and 2 (6.6%) (Fig 1).

Number of patients required for additional analgesia was 26 (86%) and 14 (47%) in control group and study group respectively (Table III).

Table III reveals that Chi-square test showed significant association between infiltration of 0.5% bupivacaine at port sites has an association ($p<0.05$) with the reduction of additional analgesia requirements during postoperative period. Therefore, consumption of additional analgesic was significantly lower in patients of study group.

The mean±SD of hospital stay in control group and study group were 2.6±0.621 and 1.6±0.492 days respectively. Patients in study group had shorter hospital stay ($p<0.05$).

Discussion

Laparoscopic cholecystectomy is largely accepted as the standard procedure for gallstone disease.[11] It has been performed as a day case procedure for over a decade[12]. However, in spite of that many patients complain substantial pain on the day of surgery.[13] Causes of pain may be due to placement of trocars through the abdominal wall, intraperitoneal resection and release of inflammatory molecules, insufflations of carbon dioxide to create pneumoperitoneum resulting in prolong elevation of the diaphragm.[14-16]

In our study the mean age of patients was 44.26 years in control group and 38.50 years in study group which was not comparable to the study conducted by Nazir & Merdan[3], in which the mean age was 49 years in control group and 46 years in study group. However, this is almost similar to the study by Gupta et al[7], where the mean age of control group was 38.7 years and 39.4 years in study group.

In our study, mean weight was 61.13 kg in control group and 59.33 kg in study group, which is not comparable to the study conducted by several authors.[1-3] We found the male female ratio in control group 11:19 and in 8:22 in study group whereas in the study of Megahed & mahmoud[2], it is 8:16 in control group and 7:17 in bupivacaine group and in Nazir & Merdan[3], it was 6:30 in control group and 7:29 in bupivacaine group.

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage.[17,18] Besides, it is a subjective sensation, so its measurement is difficult.[19] Although Verma et al[20] found that pain after laparoscopic cholecystectomy is a visceral pain. Our study and many other studies showed that local anesthetic infiltration plays an important role in reduction of postoperative pain.[21-23] In our study mean pain scores at 4 hours was found to be statistically significant however; the Nazir et al[3] and Alam et al[4] found pain scores at 6 hours to be statistically significant. Parietal or somatic pain is more important than visceral pain in first 24−48 hours postoperatively.[8,24]

In our study, the localization of pain during the first 4 hours postoperatively was 53.3% incisional, 23.3% intra-abdominal and 16.6% shoulder tip in control group and 23.3% incisional, 16.6% intra-abdominal and 6.6% at the shoulder tip in the study group. However, Nazir & Merdan[3] express the localization of pain at 6 hours for their whole study population, which was 58% at incision site and 36% at abdominal site and 6% at shoulder tip. In our study, 86% in control group and 47% in study group requested for additional analgesia which is similar to the study of Gupta et al[7] where requirement of rescue analgesic was 85% in control group and 50% in bupivacaine group. So, this reflects that the use of bupivacaine at port site reduces the postoperative additional analgesic request.

After laparoscopic cholecystectomy, patients usually discharged after 2−3 days. In our study, postoperative mean duration of hospital stay was shorter in study group than the control group which is almost similar to the study of Megahed & Mahmoud[2] and Gupta et al[7].

Laparoscopic cholecystectomy is now gold standard for the treatment of gall stones disease. Our study demonstrates that infiltration of bupivacaine at port site is extremely effective for the treatment of postoperative pain control after laparoscopic cholecystectomy.

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