Original Article

Port Site and Intraperitoneal Infiltration of Local Anesthetics in Reduction of Postoperative Pain after Laparoscopic Cholecystectomy

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Abstract

Laparoscopic cholecystectomy is now the gold standard technique for the treatment of gallstones disease. Although pain after laparoscopic cholecystectomy is less intense than after open cholecystectomy, some patients still experience considerable discomfort during the first 24 to 72 postoperative hours. The aim of this study is to evaluate the effect of intraperitoneal and port site instillation of local anaesthetics on pain relief in early postoperative period following laparoscopic cholecystectomy. Fifty patients undergoing elective laparoscopic cholecystectomy were consecutively included in this study and sample was divided into two groups. Following removal of gallbladder, Group A received 20 ml of 0.25% bupivacaine instilled in the right sub diaphragmatic space and 20 ml of 0.25%bupivacaine in divided doses at the trocar sites. The evaluation of postoperative pain was done at fixed time interval according to the numerical verbal scale and the dosage of narcotic analgesics consumed was also recorded. Mean pain scores at 6 hours and at 12 hours after surgery were 6.02 and 4.72 respectively, in the bupivacaine group compared with 8.44 and 6.08 respectively in the control group (p= <0.001 and <0.001). However, pain scores at 24hours and 48 hours postoperatively and incidence of shoulder tip pain did not differ significantly between the two groups. The mean total narcotic analgesics used in study group was 1.91 as compared to 2.50 in the control group respectively and was found to be statistically significant (p= <0.001). Infiltration of bupivacaine in to port site and intraperitoneal space is simple, inexpensive and effective technique to minimize early postoperative pain and can be practiced for elective laparoscopic cholecystectomy.

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Introduction:

Laparoscopic cholecystectomy has become a standard technique for gall bladder surgery of symptomatic cholelitheasis. The introduction of laparoscopic technique to general surgery has dramatically changed our view to the post operative course of patients after cholecystectomy[1].

Laparoscopic cholecystectomy has proven to reduce the post operative pain significantly and allow a short hospital stay and recovery period, which is reflected in patients earlier return to normal life and work activities[2, 3]. In most of the centers patients are discharged home on the first post operative day. However, few series have recently shown that the operation is safe and feasible even as an out patient procedure in properly selected patients[4, 5].

Thus, pain relief and patient comfort during the early post operative period becomes increasingly important, as the need for analgesic may delay discharge. Pain on the day of surgery is typically a diffuse abdominal pain, a more so to the right upper quadrant and right shoulder tip[6].

Decrease in post operative pain after infiltration of local anesthetics into the operative wound have been observed among patients who undergo herniorrhaphy and gynecological procedures[7]. Continuous post operative infusion of local anesthetic agent into the abdominal wound has reduced both postoperative pain and narcotic requirements[8].

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 hours.[9] The margin of safety of the bupivacaine need for anesthesia is wide. At the upper limit of 2.5mg of bupivacaine per kilogram body weight, 100mg of the drug can be used safely in a patient with a lean body mass of 40 kgs[9].

Controversy exists on source of pain after laparoscopic procedures. Some clinicians maintain that the placement of trocars through the abdominal wall is the primary source, whereas other believes that most pain arises from

intraperitoneal dissection[10]. Variable analgesic effects of periportal infiltration of local anesthetics, intraperitoneal spraying above the gall bladder, and instillation into the subdiaphramatic space and into the subhepetic space covering the area of the hepatoduodenal ligament have been reported. Some of them failed to show any benefit[11].

Our study is designed to evaluate the effect of combined intraperitoneal and port site infiltration of bupivacaine for pain relief following laparoscopic cholecystectomy.

Methodology:

This is a prospective, consecutive study conducted in the General Surgery Unit-II of Dhaka Medical College Hospital for six month. Patients scheduled to undergo elective laparoscopic cholecystectomy during March 2006 to August 2006, were included in this study. There were fifty patients who participated in this study, with twenty-five patients in each arm. All the patients gave informed consent and met the following criteria: adult patient [above 16 years] with ASA Class 1(a normally healthy individual) and 2(a patient with mild to moderate systemic disease), who were undergoing planned elective procedure for symptomatic gall stone disease. Patient with choledocholithiasis, placement of drain intraoperatively and any previous upper abdominal surgery were not included in the study. All patients were explained about the basis of study and informed consent was obtained.

All patients were screened preoperatively with the help of anesthetist and explained about the use of Numerical Rating Scale (NRS) for pain employed in this study. The scale ranged from 0-10, with 1 being the mildest pain the patient ever had and 10 being the most severe pain, zero counts for no pain[12].

Patients were randomized into the study arm and control arm using the random number table. In all cases induction, maintain and reversal of anesthesia was achieved by standard protocol.

Pneumoperitoneum was produced by insufflations of carbon dioxide with the method of open laparoscope's using Hassan's canula and port laparoscope's was carried out with carried out with gas pressure maintained between 12-14mm Hg.

After delivery of the gall bladder 20 ml of 0.5% bupivacaine solution was instilled in the right sub diaphragmatic space and another 20ml was infiltrated into the port sites (6ml was infiltrated through the abdominal wall around each midline port site and 4ml administered in the similar fashion at the lateral port sites).

In all cases, residual carbon dioxide was evacuated at the end of the procedure by compressing the abdomen before closure of ports.

The time of arrival in the postoperative ward was defined as zero hour postoperatively. Pain intensity was measured at fixed time interval at 6hrs, 12hrs, 24hrs, and 48hrs respectively. Presence of shoulder pain was also assessed during the same interval.

Patients were given narcotic analgesic intramuscularly (pethidine 50mg+ phenargan 25mg) on requirement and the total number of doses of narcotic analgesia used was recorded in a proforma. Statistical analysis of the data was done using SPSS software programmed. Independent "t" test and chi square test were used for statistical analysis. Differences were considered significant at a probability level less than 0.05.

Results

A total of 50 patients participated in the study. The male to female ratio was 1: 4 in the study group and 1:4 in control group. There were 80% of females in both study and control group. Twenty-five patients (20 women & 5men) with mean (±SD) age 36.92(±13.24) years received Bupivacaine. The control group comprised 25 patients (20 women, 5 men) with mean age 40.92 (±13.11) years.

The gas pressure in the bupivacaine group was median (±SD) 12.12 mmHg (±0.92) and that of control was 13.08 mmHg (±0.70) and was not found to be statistically significant.

Intensity of pain was assessed at fixed time intervals at 6 hrs, 12hrs, 24hrs and 48 hrs postoperatively. The Mean (±SD) score ranged from 2.68 (±0.47) to 6.08 (±0.40) for the bupivacaine group and from 2.44 (±0.51) to 8.44(±0.51) for the control group. **(Table-I)**

Table I: Mean pain Scores for study and control group

Mean (± SD) Pain Scores* postoperatively for patients given Bupivacaine compared with those not receiving Bupivacaine (control)

Postop Assessment time	Bupivacaine group	Control group	*p* value
6hrs	6.08(±0.40)	8.44(±0.51)	<0.001*
12hrs	4.72(±0.61)	6.08(±0.64)	<0.001*
24hrs	3.44(±0.51)	3.40(±0.50)	0.780
48hrs	2.68(±0.47)	2.44(±0.51)	0.091

[Ranged from 0 (no pain) to 10 (severe pain)]

* Highly significant

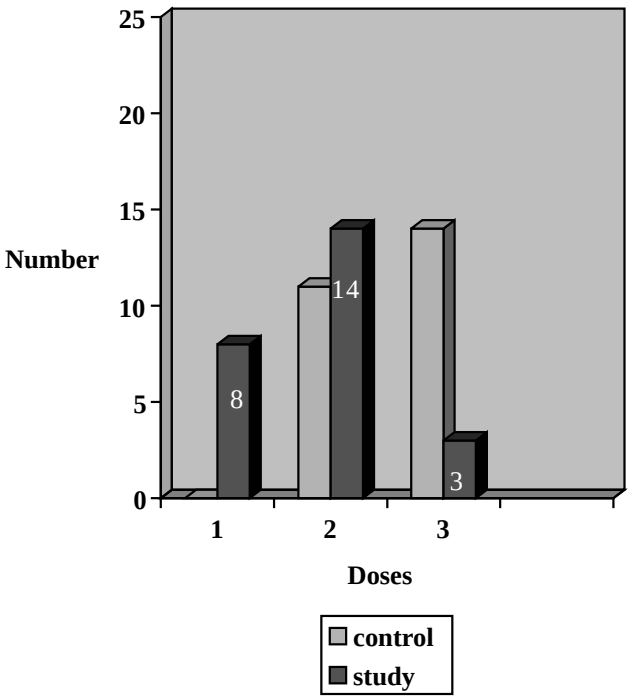
At 6 hours postoperatively the Mean (±SD) pain score of Bupivacaine group was found to be 6.08(±0.40) as compared to Control group 8.44(±0.51) and it was found to be having ***p*** value of <0.001.

Therefore, Bupivacaine provided a substantial reduction of pain intensity during the first 6 hours postoperatively and this was found to be statistically highly significant. At 12 hours postoperatively, although the Mean (±SD) was

4.72(±0.61) of study group in compare to 6.08(±0.64) of the Control group, it was found to be having ***p*** value <0.001.

It is evident that Bupivacaine did provide a substantial reduction of pain intensity during the first 12 hrs postoperatively. There was no significant difference in the intensity of pain at 24hrs and 48hrs respectively. The mean ranged between 2.68 to 3.44 in the bupivacaine group and 2.44 to 3.40 in the control group. Two patients in the study group and 3 patients belonging to the control arm experienced shoulder tip pain and it was statistically not significant (p=0.646).

Fig 1: Opoid analgesics requirement in both group of patients



The total narcotic requirement in study group was mean (SD) 1.91(±0.61) while that in control group was 2.50 (±0.51). Eight patients (32%) in the bupivacaine group required only one dose of opiod analgesic. Fourteen (56%) patients in study group received two doses of opiod analgesic whereas 11(44%) patients received those doses in control group. Fourteen patients (56%) in control arm had three doses of narcotic analgesic in compare to only 3 patients (12%) in the Bupivacaine group who required total of three doses **(Fig-I)** and it was found to be statistically significant [p= <0.001].

Discussion:

Although Minimal Invasive Surgery is characterized by reduced pain, it is not painless. Thirteen Patients undergoing Laparoscopic cholecystectomy suffer considerable pain on the day of surgery though frequently requires narcotic analgesics. [14]

Controversy exists about the principal source of pain after laparoscopic procedure. Some clinicians mentioned that placement of trocars through the abdominal wall is the primary source; whereas others believe that most pain arises from intraperitoneal dissection and insufflations of CO2 resulting in distension of abdominal wall and prolonged elevation of diaphragm[15]. Early pain after laparoscopic cholecystectomy is a complex process and includes different pain components secondary to different pain mechanisms, such as surgical trauma to the abdominal wall, intra-abdominal trauma secondary to the gall bladder removal, abdominal distention, pneumoperitoneum using carbon dioxide etc. Therefore pain should be treated multimodally[16]. We studied the effect of combined somatovisceral (intraperitoneal and port site) instillation of local anesthesia for analgesia after laparoscopic cholecystectomy.

In our study, over all pain (incisional and visceral) is reduced. Shoulder pain also reduced. In previous randomized control trial studies where incisional local anesthetics were used for analgesia Alexander[17] and Sarac[18] found reduction in the intensity of pain and opoid requirement whereas Ure[19] did not found pain to be reduced, when local anesthetics were infiltrated into the abdominal wall.

Our study showed modest overall analgesic effect whereas there was a statistically significant difference during the first 6 and 12 hours. Cuniffe[20] showed a significant decrease in shoulder tip pain after intraperitoneal bupivacaine. Our present study did not show any significant reduction in shoulder tip pain and it was consistent with the findings of Chandrigar[21] and Szem[12]. Bisgaard[22] and Michaloliakou[23] examined the effect of combined multiregional incisional and intraperitoneal local anesthetic blockade in two RCTs. Michaloiakou[23] reported a significant reduction in overall pain during the first 24 hours postoperatively. Our study also showed a significant difference in pain intensity in the early postoperative period. Bisgaard[22] showed a significant reduction in overall pain and narcotic requirements, however there was no significant effect on shoulder tip pain and it was consistent with our present study.

We found a large variation in pain scores at each of the assessment times. Aside from individual difference in pain perception, several other patient and technical factors may have affected the scores. Despite of large variation in the pain scores, we did detect differences in mean pain scores between the bupivacaine and control group during the 6 hours and 12 hours postoperative assessment. Mean pain scores at 6 hours and 12 hours were found to be statistically significant.

Although we expected the effect of the local anesthetic to wear off after the period of 6-8hours, there was no increase in the pain score at the 3rd pain assessment at 24hours postoperatively in the patients who received bupivacaine.

For the control group pain scores peaked immediately and were maximum during the first 6-8hours after the surgical procedure and there after declined to the level comparable to that for the bupivacaine group by the third assessment at 24hours postoperatively. Therefore, the main effect of bupivacaine in this study seems to have been in amelioration of pain peak occurring during the initial 6 hours after the surgical procedure. We did find an appreciable difference in total narcotic analgesics requirement between the control and bupivacaine group and this was consistent with the findings that of Bisgaard[22] in a randomized control study.

If laparoscopic cholecystectomy is to be a routine ambulatory surgical procedure, the pain experienced by the patients during early postoperative period must be addressed. Our study showed that Infiltration of bupivacaine into the port site and intraperitoneal instillation diminishes the peak of pain occurring during the first 6 hours after the surgical procedure and significantly reduces the need for narcotic analgesics.

Any reduction in such pain is relevant, particularly if it is statistically significant, whether the lower pain score translated into increased patient's comfort and compliance is questionable. However, at whatever level they functioned they did so more comfortably.

Thus, this simple, inexpensive, effective technique improves the postoperative period in-hospital course and can be practiced routinely in all elective laparoscopic cholecystectomy.

Conclusion

Laparoscopic cholecystectomy in now the gold standard for the treatment of gall stones disease when a careful, correct technique is employed, though pain after laparoscopic cholecystectomy is multifactorial; our study showed port site, intraperitoneal infiltration of local anesthetics for post operative pain relief is, in this context, an effective alternative method for early pain control and minimize the need of opoid analgesics and the technique is very simple, easily applicable.

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