

Pain after Laparoscopic Cholecystectomy: Effect of Intraperitoneal Infiltration of Injection Bupivacaine

ABDUL KHALIQ MAHAR¹, MUJEEBREHMAN MALIK², UMME HABIBA³, NAVEED ALI KHAN⁴

¹Assistant Professor Surgery, Dow University of Health Sciences, Karachi

²Senior Registrar Surgery, Dow University Hospital, Karachi

³Postgraduate Surgery, Dow University Hospital, Karachi

⁴Professor of Surgery, Dow University of Health Sciences, Karachi

Corresponding author: MujeebRehman Malik, Email: mujeebrehmanmalik1984@gmail.com, Cell: +92 332 2781019

ABSTRACT

Objective: The aim of this study is to determine the effectiveness of intraperitoneal bupivacaine in patients undergoing laparoscopic cholecystectomy.

Study Design: Prospective randomized study

Place and Duration: Study was conducted at the department of Surgery Dow University Hospital (Ojha), Karachi for duration of six months from May 2021 to October 2021.

Methods: There were 70 patients of both genders were presented in this study. Adult patients above 16 years of age, ASA class 1 & 2, undergoing elective cholecystectomy were included in this study. Informed written consent was taken from all the patients for detailed demographics age, sex and body mass index. Patients were categorized into 2 groups. Group A had 36 patients and received 40 ml of intraperitoneal infiltration 0.25% Bupivacaine at Gall Bladder bed and Right Subphrenic space. Group B control group with 34 patients received no intraperitoneal Bupivacaine. Both groups received 20 ml of 0.25% Bupivacaine at ports site incisions. All patients were educated about the standard Visual Analogue Score (VAS) pain score of 0 – 10, during pre anaesthetic evaluation visit. SPSS 23.0 version was used to analyze data.

Results: There were 28 (77.8%) females in group A and in group B females were 31 (91.2%). 43.55±13.93 years were the mean age in group A and in group B mean age was 39.94±11.54 years. Mean body mass index of group A was 26.14±13.41 kg/m² and in group B mean BMI was 25.06±11.53 kg/m². In group B close technique was used in 26 (72.2%) while in group A 24 (70.6%) cases received closed technique. Post-operatively low pain score was observed in study group as compared to group B. Frequency of rescue analgesic was higher in group B as compared to group A.

Conclusion: We concluded in this study that the use of intraperitoneal bupivacaine for laparoscopic cholecystectomy was significantly effective in terms of low pain and is an effective method for improving the quality of life within the early recovery period.

INTRODUCTION

A laparoscopic cholecystectomy is the gold standard procedure for the treatment of cholelithiasis. Because of the quicker recovery time and shorter hospital stay compared to open cholecystectomy [1], it is more preferable. Following laparoscopic cholecystectomy, recovery is influenced by factors such as stomach discomfort and shoulder tip ache. High intra-abdominal pressure and CO₂ irritate the diaphragm, resulting in these adverse effects. [2]. Lowering intra-abdominal pressure was expected to reduce these side effects. When creating pneumoperitoneum, the pressure employed is typically 15mm Hg [3]. The use of low-pressure pneumoperitoneum (less than 12 mm of Hg) has been shown to reduce post-operative pain in a few trials [2,4,5].

Following laparoscopic cholecystectomy, prolonged hospitalisation is the leading cause of morbidity. [6,7] Patients typically report back, shoulder, and port site incision pains and discomfort. Approximately 12 to 60 percent of individuals experience pain in their shoulders and subdiaphragm. For most patients, the discomfort begins to subside within two or three days following surgery. After laparoscopy, there are a variety of options for relieving post-operative discomfort. [10] Nonsteroidal anti-inflammatory medications (NSAIDs) can be used to treat peritoneal inflammation following CO₂ pneumoperitoneum [11]. Post-laparoscopy pain management with NSAIDs has been controversial [12]. Pneumoperitoneum causes pathophysiologic alterations in renal blood flow, which raises the possibility that preoperative NSAID use is unsafe [13]. Reduced shoulder pain following minor gynecologic laparoscopy was recently reported to be helped by the instillation of local anaesthesia (80 mL of Bupivacaine 0.125 percent and Epinephrine 1/200,000) under the right diaphragm [14]. It appears that this method is ineffective at relieving post-operative discomfort following laparoscopic cholecystectomy surgery. [15]

Pain referred to the shoulder may be reduced by administering local anaesthetic at the port site incision, intraperitoneal spraying above the Gall bladder bed, and instillation

of Hepatoduodenal Ligament in the right subdiaphragmatic space covering the area of Hepatoduodenal Ligament. Although numerous studies have been published examining the effects of intraperitoneal local anaesthesia following cholecystectomy, it remains controversial.

The aim of this study is to determine the effect of intraperitoneal application of 0.25% Bupivacaine after Laparoscopic Cholecystectomy.

MATERIAL AND METHODS

This is prospective randomized study of 70 patients admitted through OPD in Surgical Unit II Dow University Hospital Karachi for elective Laparoscopic Cholecystectomy from May 2021 to October 2021. All the patients gave informed consent and met the following criteria: Adult patients above 16 years of age, ASA class 1 & 2, undergoing elective cholecystectomy were included in this study where as patients with Cholelithiasis, drain placement after surgery, contraindicative to NSAIDs & Bupivacaine, surgery for Acute Cholecystitis and converted to open Cholecystectomy were excluded from the study.

Patients were randomly divided by computer generated list with Random Allocation software version 1.0 into two groups. Group A (case group) received 40 ml of intraperitoneal infiltration 0.25% Bupivacaine at Gall Bladder bed and Right Subphrenic space. Group B control group received no intraperitoneal Bupivacaine. Both groups received 20 ml of 0.25% Bupivacaine at ports site incisions.

All patients were educated about the standard Visual Analogue Score (VAS) pain score of 0 – 10, during pre anaesthetic evaluation visit.

On arrival to operating room, all the patients received similar type of standardized protocol of General Anaesthesia. All patients received inj Ceftriaxone 1 gm at the time of induction of anaesthesia. During Surgery patients were positioned in the reversed trendelenberg position with the left tilt of table.

Surgery was performed with using 4 ports standard technique two 10 mm and two 5 mm ports. Abdomen was insufflated with infraumbilical incision with CO₂, intraabdominal pressure (IAP) was maintained at 12–14 mm Hg. Gall bladder was extracted through Umbilical port, CO₂ was removed by manual compression of Abdomen. Sealed envelopes were opened at the end of surgery.

At the end of Surgery study group received 40 ml of 0.25% of Bupivacaine intraperitoneal infiltration at Right Subphrenic space and Gall bladder bed, Control group received no intraperitoneal infiltration of Bupivacaine and both groups received 20 ml of 0.25% Bupivacaine at Port site incisions, 5 ml at each port.

Age, gender, port technique and duration of procedure were also recorded. Both groups received postoperative injection Toradol (NSAIDs) 30 mg IV 8 hourly and asked about the pain score via Visual Analogue Score, pain was documented 4, 6, 8, 12 and 24 hours post operatively. InjKinZ 3mg diluted was given as rescue analgesic when required.

Data was analysed using SPSS 23.0 and t test was applied. Result were reported as mean +standard deviation. The p value of <0.05 was taken as statically significant difference between the two groups.

RESULTS

There were 28 (77.8%) females in group A and in group B females were 31 (91.2%). 43.55±13.93 years were the mean age in group A and in group B mean age was 39.94±11.54 years. Mean body mass index of group A was 26.14±13.41 kg/m² and in group II mean BMI was 25.06±11.53 kg/m². In group B close technique was used in 26 (72.2%) while in group B 24(70.6%) cases received closed technique.(table 1)

Table 1: Baseline details of enrolled cases

Variables	Group A (n= 36)	Group B (n= 34)
Mean Age (years)	43.55±13.93	39.94±11.54
Mean BMI (kg/m ²)	26.14±13.41	25.06±11.53
Gender		
Male	8 (22.2%)	3 (8.8%)
Female	28 (77.8%)	31 (91.2%)
Port technique		
Open	10(27.8%)	10(29.4%)
Close	26(72.2%)	24(70.6%)

Post-operatively low pain score was observed in study group as compared to group B.(table 2)

Table 2: Post-operative comparison of pain by using VAS

Duration after surgery	Case (n= 36)	Control (n= 34)	P - value
4 hours	4.88 ± 1.90	6.14 ± 1.95	0.008
6 hours	4.63 ± 1.75	5.76±1.61	0.007
8 hours	3.94±1.51	5.23±1.57	0.001
12 hours	3.36±1.01	4.55±1.67	0.001
24 hours	2.52±1.05	3.50±1.48	0.002

Frequency of rescue analgesic was higher in group B as compared to group A.(table 3)

Table 3: Comparison of analgesic doze among both groups

Variables	Group A	Group B
Once	11	15
Twice	00	8
Thrice	00	1
Total	11	24

Chi-square test applied between groups

DISCUSSION

It is a major advantage of the laparoscopic cholecystectomy to avoid an upper abdominal incision, which results in reduced post-operative pain and a faster recovery period. However, even

laparoscopic cholecystectomy is not completely painless. Laparoscopic cholecystectomy is associated with abdominal and shoulder tip pain in the majority of patients. Diaphragmatic irritation by increased intra-abdominal pressure generated by pneumoperitoneum or CO₂ absorption from the peritoneal cavity can induce this discomfort [2]. After a laparoscopic cholecystectomy, numerous studies have been conducted to investigate techniques to lessen post-operative pain.

Laparoscopic cholecystectomy has made significant progress in terms of reducing post-operative pain, but it is still a major issue, with up to 80% of patients requesting analgesics following the procedure.[16] Pain intensity peaks within the first 48 to 72 hours after the procedure, and then decreases over the following 48 to 72 hours.[17] There are numerous evidences that the peritoneum is the primary source of pain after laparoscopic cholecystectomy, and this is consistent with the findings of previous studies.[18] Systemic acidosis can result from CO₂ pneumoperitoneum, according to the literature .[19]

In this cross-sectional study 70 patients of both genders were presented. There were 28 (77.8%) females in group A and in group B females were 31 (91.2%). 43.55±13.93 years were the mean age in group A and in group B mean age was 39.94±11.54 years. Mean body mass index of group A was 26.14±13.41 kg/m² and in group II mean BMI was 25.06±11.53 kg/m². Results of our study was comparable to the studies conducted in past.[20,21] In group B close technique was used in 26 (72.2%) while in group B 24(70.6%) cases received closed technique. Laparoscopic cholecystectomy-related pain has been described in this study. Postoperative discomfort is largely caused by visceral aches and pains. After the first 24 hours following surgery, the pain subsides significantly. Small abdominal incisions and limited abdominal wall damage make parietal pain less acute than visceral pain. When compared to pain following a laparotomy, parietal discomfort following laparoscopic cholecystectomy is enhanced by coughing but not by mobilisation. On the second postoperative day, shoulder-tip discomfort becomes the most common complication, despite the fact that it is initially minimal.

Laparoscopy-induced pain was also substantially less severe than that following laparotomy. Parietal pain following laparotomy, which is caused by the abdominal wall being cut, is reduced by laparoscopy, which does not require big incisions or surgical retractors, and so spares the abdominal wall from recurrent stimulation by movement and coughing.[22] Researchers in those studies came to the conclusion that improved evacuation of residual carbon dioxide from the peritoneal cavity, particularly in the sub diaphragmatic region, was one of the likely mechanisms for the positive effect of intraperitoneal saline washout on post laparoscopic pain reduction. [23,24] After laparoscopic cholecystectomy, prior trials shown that intraperitoneal bupivacaine washout reduced pain for just six to twelve hours.[25] A study by Morsy, et al. found that lidocaine and nalbuphine considerably reduced pain intensity in the first 8 hours following surgery compared to intraperitoneal normal saline.[8]

We discovered that intraperitoneal bupivacaine is ineffective in the treatment of pain after laparoscopic cholecystectomy when administered intravenously. A study conducted beneath the right diaphragm found that the instillation of bupivacaine had no effect on either the intensity or the time course of the different pain components.

CONCLUSION

We concluded in this study that the use of intraperitoneal bupivacaine for laparoscopic cholecystectomy was significantly effective in terms of low pain and is an effective method for improving the quality of life within the early recovery period.

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