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ORIGINAL ARTICLE

Pain Management after Laparoscopic Cholecystectomy by Intraperitoneal Bupivacaine

TAYYABA JAFFRI[1], SYED SHEHZAD HUSSNAIN[2], KANWAL HYDER[3], FAHAD GUL[4], FAROOQ SULTAN MINHAS[5], SAADIA TARIQ[6]
[1]*Consultant General Surgeon, CMH, NUMS*
[2]*Consultant General & Laparoscopic Surgeon, CMH, NUMS*
[3]*Resident General Surgery, CMH, NUMS*
[4]*Graded Surgeon, CMH/ NUMS*
[5]*Resident General Surgery, CMH/NUMS*
[6]*Assistant Professor/HOD, School of Statistics, Minhaj University, Lahore*
Correspondence to Dr. Tayyeba Jaffri, Email: tayyebajaffri5@hotmail.com, Cell: 0321 7128909

ABSTRACT

Aim: To compare the effectiveness of 0.5% bupivacaine spray on the gallbladder at the end of surgery with the effectiveness of no spray in reducing postoperative pain within the first 24 hours.
Study design: Randomized Controlled Trial
Place and duration: The study was conducted in the Department of General Surge,Combined Military Hospital, Rawalpindi, from 23 July 2018 to 22 January 2019, after receiving approval from the ethics review board.
Method: A total of 62 patients underwent laparoscopiccholecystectomy. Indications were symptomatic gallstones (such as dyspepsia, pain in right hypochondrium, and pain after eating fatty meals). The patient age group was between 20-60 years. Patients includedAcutecholecystitis, choledocholithiasis, pancreatitis and bile leakage during surgery. However pregnant females and patients with co-morbidities were not included. Informed consent was taken from all the patients.At the end of the laparoscopic cholecystectomy, Group A infused 0.5% bupivacaine into the gallbladder depression at a standard weight of 2mg/kg, but Group B did not receive a local anaesthetic. Postoperative pain was assessed and scored in both groups from 0 to 10 at 6 and 24 hours using the VAS (Visual Analogue Scale).
Result: The mean age of patients in group A was 38.23±8.13 years, and in group B, 38.74±6.64 years. Most of the 35 patients (56.54%) were between 20 and 40 years of age. Among 62 patients, 35(56.54%) were male and 47(75.81%) were female. So the male-to-female ratio is 1:3.2. Efficacy (0.5% bupivacaine) was 22 patients (70.97%) in group A (intervention group) and 11 patients (35.48%) in group B (control group) (p-value = 0.005).
Conclusion: The study resulted that the effectiveness of 0.5% bupivacaine spray on the gallbladder at the end of surgery was superior to that of the control group.
Keywords: Bupivacaine Spray, LaparoscopicCholecystectomy, Postoperative Pain, VAS (Visual Analogue Scale).

INTRODUCTION

A little pouch called the gallbladder is located directly below the liver. Bile produced by the liver is kept there. The gallbladder is empty and flat after meals, similar to a deflated balloon. The gallbladder may be around the size of a small pear and filled with bile before a meal. The gallbladder constricts in response to hormonal cues, expelling stored bile into the small intestine via a network of tubes known as ducts. The gallbladder itself is not necessary, even if bile aids in the digestion of lipids. In a healthy person who has their gallbladder removed, there are usually no obvious issues with their health or digestion, however, there is a very small chance of diarrhoea and fat malabsorption[1].

A less invasive surgical technique called laparoscopic cholecystectomy is done to remove a sick gallbladder. This method has mostly taken the place of the open method for cholecystectomies since the early 1990s. The treatment of acute or chronic cholecystitis, symptomatic cholelithiasis, biliary dyskinesia, acalculouscholecystitis, gallstone pancreatitis, and gallbladder tumours or polyps is now suggested by laparoscopic cholecystectomy[2]. In comparison to open cholecystectomy, laparoscopic cholecystectomy is currently the gold standard surgical method with less stress and a quicker recovery. However, following laparoscopic surgery, the majority of patients experience excruciating shoulder and abdominal pain and need analgesics[3]. In terms of pain relief and a brief hospital stay, laparoscopic cholecystectomy is preferable to open cholecystectomy[4].

As pain management is clinically important to get proper care for surgical patients. Despite advances in understanding the pathophysiology of pain, analgesic pharmacology and the development of more effective postoperative pain management techniques, patients continued to experience considerable discomfort[5]. With major abdominal surgery, postoperative pain is a major problem. As part of the post-surgical inflammatory response, pain can lengthen hospital stays and, by activating nociceptors, contribute to the development of the ileus and delayed bowel movements. Genuine visceral pain differs from somatic pain in terms of physiology and clinical manifestation. Ischemia, inflammation, and distention cause visceral discomfort reactions. Deep, gnawing, twisting, agonising, colicky, or dull are frequent descriptors for visceral pain, which is poorly defined and nonspecific. Typically, it is accompanied by highly emotional autonomic symptoms, such as sweating, nausea, and vomiting (e.g. nervous, feeling of imminent doom)[6]. Today, local anaesthetics are increasingly being used internally for surgery to control pain. As the use of local intra-peritoneal anaesthetic is very safe and has resulted in a significant decrease in the number of postoperative abdominal pain scores. Usually, a local anaesthetic is not used after surgery to control pain. If its effectiveness is found to be high, then it can be generally recommended in our practice to prevent postoperative pain that will make our patients feel better after surgery and shorten hospital stays.

A common kind of local anaesthetic is bupivacaine. To reduce pain for up to 20 hours following surgery, it is typically injected into surgical incision sites. Its duration of action is considerably longer than that of other local anaesthetics. When administered in big dosages, it is also the most harmful to the heart. Other long-acting local anaesthetics, such as ropivacaine and levobupivacaine, are employed as a result of this issue. An enantiomer of bupivacaine, levobupivacaine is a derivative of bupivacaine. Local anaesthetic effects on the central nervous and cardiovascular systems are related to their systemic absorption. Changes in cardiac conduction, excitability, refractoriness, contractility, and peripheral vascular resistance are hardly noticeable at therapeutic blood concentrations. Toxic blood concentrations, on the other hand, reduce cardiac excitability and

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conduction, which can lead to cardiac arrest, atrioventricular block, and other life-threatening arrhythmias. Reduced cardiac output and arterial blood pressure also result in decreased myocardial contractility and peripheral vasodilation. Local anaesthetics can stimulate the central nervous system, cause depression, or both after systemic absorption.

MATERIALIANDIMETHODT

After receiving clearance from the ethical review board, this experiment was carried out in Surgical Department of the Combined Military Hospital, Rawalpindi from July 23 to January 22, 2019. The sample size was determined using a tool provided by the WHO. The predicted population proportion 1% of P1 and 66.67 percent of P2 are respectively. A sample size of 31 people for each group was determined. Consecutive sampling without regard to probability was used. Patients between the ages of 20 and 60 who underwent elective laparoscopic cholecystectomy for symptomatic gall stones were included, as were patients of both genders and ASA I and II status. Those who underwent an open cholecystectomy instead, those with acute cholecystitis, choledocholithiasis, pancreatitis, bile leakage during surgery, pregnant women, or those who had undergone major abdominal surgery before were not included. Following the documentation of demographic data and random distribution into two equal groups, based on lottery methods A and B, patients having laparoscopic cholecystectomy who satisfied the inclusion criteria were chosen. Written informed consents were guaranteed. Pneumoperitoneum was created after anaesthesia was induced and was maintained during the whole procedure by injecting CO_2 using a Veres needle into the periumbilical incision at a pressure of 12mmHg. The laparoscopic surgeon carried out each procedure utilising the traditional four-port laparoscopic cholecystectomy approach. Group A, 0.5% bupivacaine was sprayed in the gall bladder bed at an ideal dose of 2mg/kg body weight after laparoscopic cholecystectomy, whereas group B received no intraperitoneal local anaesthetic. Only at the patient's request was intravenous ketorolac 30mg every 8 hours used for postoperative analgesia. Both groups of patients spent at least 24 hours in the hospital. Using VAS values from 0 to 3, postoperative pain was measured and rated in both groups at 6 and 24 hours. The Performa was made specifically for recording information. Patients were deemed to have an effective analgesia effect if their pain score ranged from 0 to 10 and an ineffective manoeuvre effect if their pain level was higher than 10.

SPSS version 20.0 was used to enter and analyse all of the data. Age and BMI, two quantitative variables, were shown as mean and standard deviation. The frequency and percentages of the qualitative factors, such as gender, ASA status, and efficacy of the two groups, were shown. The effectiveness of the two groups was compared using chi-square, and a P-value of 0.05 or above was deemed significant.

RESULTS

A total of 100 patients were enrolled in the study but 38 were excluded. After exclusion, 62 patients were analyzed. There was female predominance with 47(75.81%) being female.

Table 1: Characteristics of participants in either group (n=62)

Variable	Intervention Group A	Control Group B
Age in years		
20-40 years	17 (54.84%)	18 (58.06%)
41 -60 years	14 (45.16%)	13 (41.94%)
Gender		
Male	19 (61.2%)	15(48.3%)
Female	12(38.7%)	16(51.6%)
BMI		
< 27	11 (35.48%)	9(29.03%)
> 27	20(64.52%)	22 (70.97%)
ASA		
I	14 (45.16%)	14 (45.16%)
II	17(54.84%)	17(54.84%)

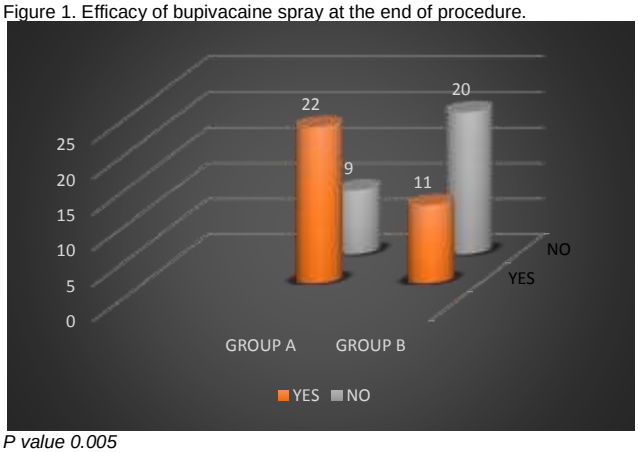
The age range in this study was from 20 to 60 years with a mean age of 38.52 ± 7.13 years. The majority of the patients 35(56.54%) were between 20 to 40 years of age. BMI was 29.32±2.46kg/m^2. Patients were later stratified as groups A and B as intervention and control groups respectively as shown in Table1.

Post operatively low pain score was observed in intervention Group A as compared to control Group B.

Table 2. Stratification of patients according to modifiers in either groups.

Variable	Intervention Group A n (%) Efficiency	Control Group B n (%) Efficiency	P – value
Age in years			
20-40 years	12 (38.7)	8(25.8)	0.118
41 -60 years	10 (32.2)	2(0.6)	0.003
Gender			
Male	6(19.3)	4 (12.9)	0.464
Female	16 (51.6)	6 (19.3)	0.002
BMI			
< 27	6(19.3)	4(12.9)	0.653
> 27	16(51.6)	6 (19.3)	0.001
ASA			
I	11(35.4)	5 (16.1)	0.022
II	11(35.4)	5 (16.1)	0.039

Figure 1. Efficacy of bupivacaine spray at the end of procedure.



P value 0.005

DISCUSSION

In 17% to 41% of patients, pain is a major cause of hospital stay[7] and the main reason why patients take long time to recover[8]. Because postoperative pain after laparoscopic surgery is complex and experts suggest that effective local analgesic treatment should be supported[8-15]. This type of support is also empathetic to patients, making them feel comfortable, explaining the procedure and its problems before surgery and administrating a non-inflammatory analgesic agent an hour before surgery[6-18]. It should also include penetration into the skin with a local anaesthetic before any operation, opioid administration during surgery, injecting a local anaesthetic into the peritoneal cavity at the end of the surgery, while giving the patient ample fluids and electrolytes[18].

The postoperative VAS values were significantly lower in patients who received bupivacaine than in those who received normal saline, according to Dath D et al (1999), who also suggested that local anaesthetic application in the area of the trocar incision be regarded as normal following laparoscopic cholecystectomy. Other research examining the effects of local anaesthetic on postoperative pain, analgesia, and antiemetic medicine usage in patients undergoing laparoscopic cholecystectomy compared incisional bupivacaine to normal saline administered before trocar implantation[20].

The use of local anaesthetics in the incisional region before surgery was advised by Lee et al (2001), who compared the

preoperative and postoperative application of incisional and intraperitoneal bupivacaine (60 mL, 0.25 percent) and found that pain was significantly reduced in the incisional infiltration group as compared to the postoperative incisional infiltration group and preoperative and postoperative intraperitoneal infiltration groups.

In a study by Gharaibeh et al. (2000), they compared intraperitoneal 0.25 percent bupivacaine with placebo during laparoscopic cholecystectomy and discovered that pain was significantly reduced in the group that received local anaesthesia. They also noted that the use of bupivacaine in the gallbladder bed was effective in reducing shoulder pain.

Alam MS et al (1970)[23] aimed to assess the effect of intraperitoneal infiltration of local anaesthetic in reducing pain in the first postoperative period following laparoscopiccholecystectomy. They concluded that the introduction of bupivacaine into the port area and intraperitoneal space is a simple, inexpensive and effective way to reduce postoperative pain and can also be considered as standard laparoscopiccholecystectomy of choice.

The efficiency of local anaesthetic injected into the right hemidiaphragm's peritoneum was compared to the control group by Roberts KJ et al (2011). In which 128 consecutive participants who underwent a chosen laparoscopic cholecystectomy participated in a double-blind, randomised, controlled experiment. Those patients received subcutaneous bupivacaine and diaphragmatic injection of bupivacaine with a topical bath over the liver/gall bladder depending on dose versus placebo. The primary effect was on pain scores in the ward while the secondary effect was on pain scores in theatre recovery, physical examination, meal time, ambulation and post-operative analgesic use. Therefore it was found that pain scores in the theatre were significantly lowered in both types of local anaesthetic groups but only subperitoneal diaphragm injection was associated with low pain scores in the ward as compared to control.They came to the conclusion that using intraperitoneal local anaesthetic procedures during laparoscopic cholecystectomy reduced both the length of the theatrical recovery period and postoperative discomfort. After laparoscopic cholecystectomy, a local anaesthetic injection into the right hemidiaphragm is associated with lower pain scores for a longer length of time than previously advised baths.

CONCLUSION

This study concluded that the effectiveness of 0.5% bupivacaine spray on the gall bladder at the end of surgery is better compared to the control group. Therefore, we recommend that 0.5% of bupivacaine injected into the gallbladder at the end of surgery should be used sparingly to prevent postoperative pain that will make our patients more comfortable after surgery and shorten hospital stay.

Conflict of interests: There is no conflict of interest between the writers of this work.

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