Original Article

Effect of 0.5% Bupivacaine at the Surgical Bed After Laparoscopic Cholecystectomy

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Objective: To evaluate the effect of 0.5% bupivacaine irrigated at the surgical bed on postoperative pain relief in laparoscopic cholecystectomy patients.

Material & Methods: This study included 80 patients undergoing elective laparoscopic cholecystectomy who were prospectively randomized into 2 groups. The placebo group (n=40) received 20cc saline without bupivacaine, instilled into the gallbladder bed. The bupivacaine group (n=40) received 20cc of 0.5% bupivacaine at the same surgical site. Pain was assessed at 0, 6, 12, and 24 hours by using a visual analog scale (VAS).

Results: A significant difference (p=0.018) was observed in pain levels between both groups at 6 hours post operatively. The average analgesic requirement was lower in the bupivacaine group, but this did not reach statistical significance.

Conclusion: The use of bupivacaine irrigated in the surgical bed was an effective method for reducing pain during the first postoperative hours after laparoscopic cholecystectomy.

Key Words: Bupivacaine, Irrigation, Postoperative pain, Laparoscopic cholecystectomy,

Introduction

Gall stones are the common problem in our society and laparoscopic cholecystectomy is considered the gold standard treatment for benign gallbladder disease. It is characterized by a short hospital stay and an early return to regular activity.[1,2,3] Strategies to handle the different intra-abdominal surgical pathologies with a laparoscopic approach offer a significant benefit compared with the conventional technique.[1,2] Laparoscopic cholecystectomy has improved surgical outcome in terms of reduced pain and convalescence compared to conventional cholecystectomy.[1,2] However, the postoperative pain is considerable. Pain management with multiple analgesic and opioids has been reported with variable success.[1,2,4] In laparoscopic cholecystectomy, pain is derived from multiple situations: incision pain (somatic), deep intra-abdominal pain (visceral), and shoulder pain (visceral pain due to phrenic nerve irritation).[5,6] In 17% to 41% of the patients, pain is the main cause for staying overnight in the hospital the day of surgery[2-7] and the primary reason why the patients have a longer convalescence.[6,8,9]

Because postoperative pain after laparoscopic surgery is complex, specialists suggest that effective analgesic treatment should be a multi-modal support.[3,4,815] This type of support consists of establishing empathy with patients, making them feel confident, explaining the procedure and its complications, and administration of a non-steroidal anti-inflammatory analgesic agent an hour before surgery.[6,10,12-14] It should also include blocking the sensitive afferences (infiltrating the skin with a local anesthetic before any incision), administration of an opioid perioperatively, irrigating a local anesthetic in the peritoneal cavity, providing the patient with fluids and electrolytes.[5,6,8,10,14,20] The aim of this study was to evaluate the use of the irrigation of a local anesthetic, such as bupivacaine, at the surgical bed for postoperative pain reduction. Secondly, we tried to assess whether this analgesia method reduces the postoperative use of non-steroidal anti-inflammatory drugs (NSAIDs).

Material & Methods

This prospective randomized experimental study was conducted at Services Hospital, Lahore from June 2010 to December 2011. All patients were included who underwent elective laparoscopic cholecystectomy between age group 20 to 60 years. Exclusion criteria were pregnancy, open cholecystectomy, and acute cholecystitis. Informed and written consent was obtained from all participating in the trial. Eighty patients undergoing elective laparoscopic cholecystectomy were prospectively randomized into 2 groups. In the control or placebo group, 20cc of normal saline solution without bupivacaine was irrigated at the surgical bed after laparoscopic cholecystectomy. The experimental group was irrigated with 20cc of bupivacaine 0.5% in normal saline solution. Before surgery, all the patients underwent upper abdominal ultrasound, ECG, chest X-rays, a complete blood count, liver function tests, and a coagulation profile. A standard operative method was used with a 4-trocar technique in all

patients. Pneumoperitoneum was achieved in every case with the use of a Veress needle through a periumbilical incision, and was maintained at 14mm Hg during the entire surgical procedure.

After removal of the gallbladder, hemostasis was performed at the surgical bed. After gallbladder extraction, randomization was performed using a computer program (www.randomized.com). Irrigation of the surgical bed was done with the insertion of a feeding tube through the right subcostal port. After irrigation of the gallbladder, gas, instruments, and trocars were removed. No drains were used. There were no complications in the perioperative period in any patient. Pain was assessed using a visual analog scale (VAS) of 0 to 10. Assessment was carried out in the recovery room at 30 minutes and 60 minutes postoperatively. Measurement in the patients room was performed 6,12, and 24 hours after surgery. All the patients were allowed to receive analgesic medication as needed, and the requirement of these medications was recorded. VAS was explained to every patient. The number "0" was equivalent to no pain, and "10" was the worst pain they ever felt. Administration of analgesics was correlated with the reading of VAS. Timing of the initial administration of analgesics was also recorded. Different IV analgesics, such as non-steroidal anti-inflammatory drugs (NSAIDs), were used to reduce the postoperative pain. Evaluation of postoperative symptoms, such as nausea, vomiting, and fever, were also recorded during the hospital stay. Initiation of oral intake and ambulation were also recorded. Statistical analysis was performed using a chi-square analysis; significance was determined as $p \leq .05$ and the $p < .05$ was considered statically significant.

Results

Eighty patients were included in this study; 70 were women and 10 were men ranging in age from 22 to 57 years. The average in the bupivacaine group was 29.7 years and in the control group 36 years. The result was significant for the age in both groups **(Table 1).**

A significant difference occurred in the average pain levels at 6 hours postoperatively between the control and experimental groups **(Table 2).** No significant difference occurred between the 2 groups during the other time intervals. The patients who needed analgesics asked for their first dose at 4 hours postoperative time. The average analgesic requirement was lower in the bupivacaine group, but this did not reach statistical significance.

Nausea was the most common postoperative symptom reported, with an incidence of 30% in the experimental group and 45% in the control group. There was no significant statistical difference. Four patients experienced vomiting, two from each group with no significant difference. Only 3 patients in the control group experienced fever. These patient were treated with 500 mg of acetaminophen by mouth

Table-1: Demographic data.

Characteristics	Bupivacaine Group	Placebo Group	P value
Female / Male	40/40	36/40	0.51
Age (SD)$_a$	29.7(9.2)	36.7 (9.5)	0.01

Table-2: Comparison between groups.

Visual analog scale	Processing group (bupivacaine) n=40	Control group (placebo) n=40	P value
Pain T0 p50 (p25- p75)	2 (1-3)	5 (1-5)	0.060
Pain T6 p50 (p25-p75)	4.5 (2.7-5)	7 (4-25)	0.02*
Pain T12 p50 (p25-p75)	3 (2-4)	4(4-5)	0.615
Pain T24 p50 (p25-p75)	1.40(1-2)	3(1-2)	0.650

**Statistically significant: **p50, median; p25-p50, interquartile rank.*

Table-3: Comparison of post-surgical symptoms.

Post-surgical Symptoms	Processing group (Bupivacaine) n=40	Control group (placebo) n=40	P value
Nausea n (%)	12 (30)	18 (45)	0.39
Vomiting n (%)	2(5)	2 (5)	1
Fever n (%)	0	3 (7.5)	1

Table-4: Recovery indices.

Variables	Processing group (Bupivacaine) n=40	Control group (Placebo) n=40	p value
Time to start eating hr p50 (p25-p75)	8.0	10	0.45
Time to walk hr p50 (p25-p75)	13	12	0.29

Table-5: Analgesic requirement in the 2 study groups.

	Processing group (Bupivacaine) n=40	Control group (Placebo) n=40	p value
Analgesia required n	20	35	.018*

discharged the second postoperative day **(Table 3).** Oral intake and ambulation are shown in (**Table 4).** No statistical differences were found of the 80 patients included in the study. 55 of total patients required intravenous postoperative analgesics; 20 patients were from the bupivacaine group and 35 from the control group with a statistically significant difference (p=0.018) **(Table 5)**. This difference was mainly noted at the 6-hour interval postoperatively.

Discussion

Laparoscopic cholecystectomy is one of the most frequently performed elective surgeries and it is a gold standard procedure for symptomatic gall stones. It is a short stay procedure, and therefore, adequate postoperative pain relief is of considerable importance, which makes it ideal for patients. Postoperative pain in these patients is observed in peaks immediately after surgery and decreases after 24 postoperative hours. The cause of early postoperative pain in laparoscopic cholecystectomy is not clearly understood. This study demonstrates that 0.5% bupivacaine irrigation at the surgical bed decreases pain in laparoscopic cholecystectomy patients. With our results, we assumed that early post surgical pain was generated by irritation of the peritoneum, and the application of bupivacaine may relieve this pain. Of the 40 patients in the bupivacaine group, 20 did not require immediate analgesia based on their VAS recording of tolerable pain. In the placebo group, only 5 patient did not require analgesia. Even so, the pain experienced by both groups was of moderate intensity. The most common location for this pain was the right upper quadrant followed by pain at the trocar sites. VAS in both groups was significantly different for the decrease in pain in patients irrigated with bupivacaine at 6 postoperative hours. We conclude that there was better control of visceral pain during the first postoperative hours, which may be associated with the time of bupivacaine duration, which is from 3 hours to 10 hours on average.

Importantly, pain is a manifestation that varies from one person to another, depending largely on the pain threshold of each person and how each perceives pain, so today the tools to measure pain are subjective. VAS is based on the results of each patient's verbal comments. This study indicates that it is feasible to perform this type of procedure to have better control of postoperative pain in ambulatory laparoscopic surgery. The most common postoperative symptom in this study was nausea in 30 patients, and this was not significantly different between groups. It was followed by vomiting in 4 patients and fever in 3 patients. Therefore, we can conclude that the use of bupivacaine can reduce the postoperative pain occurring in the first hours after the surgery. But this does not cause a decrease in other symptoms such as nausea.

Conclusion

This study demonstrates that irrigation of bupivacaine at the surgical bed in laparoscopic cholecystectomy will significantly lower the intensity of postoperative visceral pain, as well as analgesic consumption in the post-surgical hours. Bupivacaine at the dosage used were very safe and had no significant side effects.

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