

# Irrigation of Gallbladder bed with bupivacaine for post-operative pain relief in laparoscopic cholecystectomy.

Sabah N. Al-Saad\*

MBCh , DA, FICMS, CABA&amp;IC

## Summary:

**Background:** Although pain after laparoscopic cholecystectomy is less intense than after open Cholecystectomy, some patients still experience considerable discomfort, and use of local anaesthetics irrigation is controversial.

**Objectives :** to evaluate the effect of intraperitoneal and port site instillation of local anaesthetics on pain relief in the first 6 hours postoperatively.

**Patient and Method:** Forty patients underwent elective laparoscopic cholecystectomy were included in this study and sample was divided into two equal groups. Group A received 20 ml of 0.9% normal saline instilled in the gallbladder bed, while group B received 20 ml of 0.25% bupivacaine instilled in the same region and 10 ml of 0.5% bupivacaine in divided doses at the trocar sites. The evaluation of postoperative pain was done at fixed time interval according to the numerical rating scale, and the request time of analgesics, pain site and vital signs were recorded.

**Results:** Pain score showed significant difference only at 0h and 1h with p-value <0.05, otherwise there was no significant differences in the following hours. Request for analgesia showed no statistically significant differences.

**Conclusions:** Intraperitoneal irrigation of bupivacaine is not so effective in decreasing pain after laparoscopic cholecystectomy.

**Keywords:** Bupivacaine; cholecystectomy; laparoscopy; pain; intraperitoneal irrigation.

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## Introduction:

The clinical and economic benefits of laparoscopic cholecystectomy are now proven, with comparable or shorter operating times, shorter hospital stay (often a day case), more rapid return to full activity and less morbidity/mortality compared to open surgery.[1]the post-operative pain may be visceral or somatic, upper abdominal, lower abdominal or in shoulders as well.[2] Their optimal management has a potential for shortening of hospital stay and for speeding up of recovery. [3] Pain following laparoscopic intervention is less intense and is of shorter duration compared to their open counterpart. However, the pain is most severe in early postoperative period, due to greater visceral than parietal (abdominal wall) component of pain.[4]

The pathogenesis of the characteristic post-laparoscopic pain syndrome has not been entirely explained. But there are some theories that suggest subdiaphragmatic and peritoneal irritation, and asubphrenic gas bubble so active aspiration of the residual gas at the end of the operation reduces postoperative pain. One popular hypothesis is that the retained carbon dioxide causes a local acidosis in the peritoneal lining which induces pain.[5].In laparoscopic cholecystectomy, overall pain is a conglomerate of three different and clinically separate components: incisional pain (somatic pain; the abdominal wall is innervated by the anterior primary rami of T7–L1. Its segmental cutaneous supply is readily mapped out if it is remembered that T7 supplies the xiphoid, T10 the umbilicus

and L1 the groin.), visceral pain (deep intraabdominal pain), and shoulder pain (presumably referred visceral pain).[6,7] Opioids and non-steroidal anti-inflammatory drugs(NSAIDs) are generally used for management of postoperative pain after laparoscopic cholecystectomy. However, the clinical value of infiltration of wounds with local anaesthetics, their intraperitoneal application, as well as the choice and dosages of local anaesthetics still remain controversial.[3] Local anesthetic infiltration (e.g., intraperitoneal, port-site infiltration) for postoperative pain relief after laparoscopic cholecystectomy produces contradictory results. Careful evacuation of residual CO2 after desufflation was shown to be effective.[8]

“Numerical rating scale” was used as a pain scoring system, as it is the simplest and most commonly used scale. The numerical scale is most commonly 0 to10, with 0 being “no pain” and 10 being “the worst pain imaginable”. The patient picks the number that best describes the pain dimension, usually intensity. Advantages of Numerical rating scale include simplicity, reproducibility, easy comprehensibility, and sensitivity to small changes in pain.[9].No Pain 0 1 2 3 4 5 6 7 8 9 10 Worst Pain

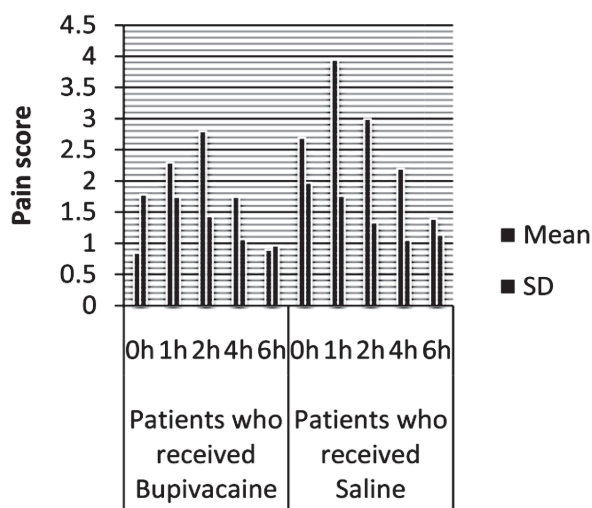
Bupivacaine is popular for use in a wide array of applications, including infiltration (0.25%), peripheral nerve blocks (0.375–0.5%), spinal (0.5 and 0.75%), and epidural (0.5 and 0.75%) anesthesia. Because of systemic toxicity, it is not used for IV regional anesthesia.[10]

\*Specialist anaesthetist, Baghdad Teaching Hospital.

**Patients & Methods:**

40 patients of ASA I & II, undergoing laparoscopic cholecystectomy under General anaesthesia, were randomly divided into two groups. At the end of surgery, Group A received 20 ml of 0.9% normal saline instilled in the gallbladder bed, while group B received 20 ml of 0.25% bupivacaine instilled in the same region and 10 ml of 0.5% bupivacaine in divided doses at the trocar sites. The evaluation of postoperative pain was done at fixed time interval according to the numerical rating scale, and the request time of analgesics, pain site and vital signs were recorded. All patient received 200 mg cimetidine, 10 mg metoclopramide, 8 mg dexamethasone and 2-3 mg midazolam as pre-induction agent. Anaesthesia was induced with 1-1.5 mg/kg of total body weight of propofol, 0.5 mg/kg Ketamine, 50-100µg fentanyl, and tracheal intubation (with size 7.0-8.0 ID endotracheal tube) was facilitated with 0.5 mg/kg of lean body weight of Atracurium. Anesthesia was maintained with halothane 0.6-1.2% in 100% oxygen. Neuromuscular blockade was maintained with atracurium 10 mg increment doses every 20. Reversal of neuromuscular blockade was done at the end of surgery with 2.5 mg neostigmine and 1.2 mg Atropine. Numerical rating scale of 0-10 was explained to the patients during preoperative visit as below: 0: no pain, 1-2: mild pain, 3-4: moderate pain, 5-6: severe pain, 7-8: very severe pain, and 9-10: worst possible pain. Level of pain was assessed using the 10 point numeral rating scale at 0, 1, 2, 4 and 6 hours after surgery. Rescue analgesic, tramadol 100 mg intramuscular, was given whenever patients complained of moderate to severe pain. Data analysis was done using word excel and SPSS 20. Independent samples T test was used for inter-group comparison. Results were reported as mean ± standard deviation. The p value of <0.05 was taken as statistically significant difference between the two groups.

**Results:**

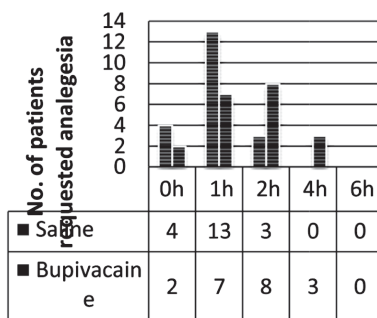


**Figure 1: The Pain Scores in both Groups**

**Table 1: Comparison between the Pain Scores in both groups**

	Drug	Mean	Std. Deviation	t-test for Equality of Means (Sig. (2-tailed))
Pain 0h	Saline	2.70	1.976	.004
	Bupivacaine	.85	1.785	
Pain 1h	Saline	3.95	1.761	.005
	Bupivacaine	2.30	1.750	
Pain 2h	Saline	3.00	1.338	.651
	Bupivacaine	2.80	1.436	
Pain 4h	Saline	2.20	1.056	.189
	Bupivacaine	1.75	1.070	
Pain 6h	Saline	1.40	1.142	.144
	Bupivacaine	.90	.968	

Figure 1 and table 1 demonstrate the mean and SD of pain scores in both groups, with the p-value for pain score in each respective hour between the two groups, and the p-value of significance considered to be <0.05. Only p-value pain scores at “0 hour” and “1st hour” were found to be significant with (0.004) and (0.005) respectively.



**Figure 2: The Times for Requesting Analgesia in both groups**

**Table 2: Comparison between the Times for Requesting Analgesia in both groups**

	Drug	Mean	Std. Deviation	t-test for Equality of Means (Sig. (2-tailed))
Analgesia 0h	Control	.20	.410	.389
	Bupivacaine	.10	.308	
Analgesia 1h	Control	.65	.489	.060
	Bupivacaine	.35	.489	
Analgesia 2h	Control	.15	.366	.080
	Bupivacaine	.40	.503	
Analgesia 4h	Control	.00	.000	.075
	Bupivacaine	.15	.366	
Analgesia 6h	Control	.00	.000a	-
	Bupivacaine	.00	.000a	

a. t cannot be computed because the standard deviations of both groups are 0.

Figure 2 and table 2 demonstrate the mean and SD of request for analgesia in both groups, with the p-value for pain score in each respective hour between the two groups, and the p-value of significance considered to be  $<0.05$ . There is no significant difference between the control group and the test group in all hours of monitoring.

#### **Discussion:**

Although Minimal Invasive Surgery is characterized by reduced pain, it is not painless. Pain after laparoscopic surgery is variable in duration, intensity and character. Tendency and preference of patients for laparoscopic surgery is more due to cosmetic scars, less hospital stay and less pain. However, there is less importance in recognition and management of pain. The origin of pain after laparoscopic cholecystectomy is multifactorial with pain arising from incision sites (somatic pain), from the gallbladder bed (visceral pain) and as a consequence of capnoperitoneum. Our study failed to show decrease in post-operative pain except in immediate post-operative period and within the first hour post-operatively. In addition, there was no significant difference in post-operative analgesia requirement regarding timing. Regarding hemodynamic and respiratory parameters, we did not find any statistically significant differences between saline and bupivacaine groups. Our results are consistent with other studies in which intraperitoneal administration of local anaesthetic has been shown to have a modest analgesic effect. [11,12,13]

Maharjan&Shrestha[2] found that intraperitoneal infiltration of 0.25% bupivacaine along with infiltration in and around the all ports used, decreases the pain in first 24 hours and there will be less analgesic consumption as well. Boddy et al [14], in systematic review and meta-analysis, found that the use of intraperitoneal local anaesthetics seems to be safe and results in a statistically significant reduction in early postoperative abdominal pain. It may be of particular benefit when the operation is planned as an ambulatory procedure to improve same-day discharge rates. Finally, there is some evidence to suggest that LA may be more effective if used at a larger strength and if at least some is instilled before any dissection. Raetzell et al[15], concluded that the administration of bupivacaine up to a dose of 125 mg intraperitoneally after laparoscopic cholecystectomy fails to provide significant analgesic benefit. Since significant side effects on pulmonary function and oxygen saturation occur, they do not recommend intraperitoneal local anaesthetics for pain therapy after laparoscopy.

Verna et al[16], found that Visceral pain is prominent after laparoscopic cholecystectomy and can be effectively controlled by 0.5% bupivacaine-soaked Surgicel in the gallbladder bed alone. Trocar-site infiltration alone is ineffective.

Nasiran et al[17], concluded that intra-abdominal injection of 0.8 cc/kg of 0.25% bupivacaine in the gallbladder site in patients undergoing laparoscopic cholecystectomy

significantly reduces postoperative pain and opiate request and consumption.

Alkhamesi et al[18], their results yielded that aerosolized bupivacaine significantly reduced postoperative pain in comparison with all other treatments ( $p < 0.05$ , other treatments were aerosolized saline and injections of saline or bupivacaine into the gallbladder bed). Injection of bupivacaine into the gallbladder bed did not result in a significant difference from the control condition.

Lee et al [2,19] had studied the bupivacaine infiltration in ports and intraperitoneal infiltration before and after surgery. In that study, incisional somatic pain dominated and incisional pain was lower in patients with preincisionalperiportal injection. Peritoneal infiltration did not decrease visceral pain. They had recommended preincisional bupivacaine to decrease somatic pain after surgery. Bisgaard[6], in his review article, recommended Incisional local anaesthetics as seven of eight trials favoured the use of incisional local anaesthetics, and mentioned that Intraperitoneal local anaesthetics may have a future role in postoperative analgesia, but results are conflicting and evidence from more trials of high quality is required. There is no conclusive information on dose and timing of local anaesthetics infiltration.

The analgesic effects of intraperitoneal local anesthetic blockade after laparoscopic cholecystectomy versus placebo have been investigated in 24 randomized trials (predominantly of poor or modest methodologic quality). Nine trials were negative (1 high- and 8 poor-quality trials), and 15 trials demonstrated significant analgesic benefits (5 high or moderate- and 10 poor-quality trials). There was no obvious relation between instillation site, dose, timing, and degree of pain relief. A recent combined systematic quantitative and qualitative review[6,11] (literature search 1966–1999) suggested a statistically significant weighted mean difference of 13 mm in visual analog scale scores in favor of intraperitoneal local anesthetic compared with placebo after laparoscopic cholecystectomy. However, a quantitative analysis of pooled data methodologic quality[6,20] suggested that early instillation of intraperitoneal local anaesthetics provided better postoperative pain control compared with instillation at the end of surgery but was contradicted by another trial of moderate methodologic quality. [6,21]

Alam et al[22], their study showed modest overall analgesic effect whereas there was a statistically significant difference during the first 6 and 12 hours.

Rehan et al[23], had found that infiltration of 0.25% bupivacaine at port sites, under the right hemi diaphragm and gall bladder bed decreases the post operative pain in first 24 hours. It also significantly reduces the analgesic requirements in the postoperative period in first 24 hours.

#### **Conclusion:**

Gallbladder bed irrigation with Bupivacaine is a good

analgesic choice for post-operative pain relief in laparoscopic cholecystectomy operations, but its effect is limited to about only one hour. Local anaesthetics toxicity or side effects were of our concerns, so the total dose of Bupivacaine used was about 1.25-1.5mg/kg. Results confirmed the safety of the technique, as there was no hemodynamic instability in the Bupivacaine group.

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