LETTER TO THE EDITOR

Intraperitoneal Bupivacaine for Postoperative Pain Relief After Laparoscopic Cholecystectomy

Laparoscopic technique has become the gold standard for cholecystectomy in the past decade. Most patients are being discharged the same day as surgery or on the first postoperative day [1,2]. One important benefit of laparoscopic surgery generally is reduced postoperative incisional pain, whereas in open surgery the pain and discomfort from a large abdominal wall incision may be severe enough to prevent early discharge [3]. However, in laparoscopic cholecystectomy (LC) pain, nausea, and vomiting stemming from visceral manipulation may be severe enough to prevent early discharge. Peripheral use of local anesthetics for postoperative pain relief has become a popular practice in many minor surgical procedures and in laparoscopic procedures as well [4,5]. Although there is limited experience with use of lidocaine, mepivacaine, and ropivacaine, with its relatively potent anesthesia and longer duration of action, up to 6 hours, bupivacaine has become popular recently [6–10]. Nevertheless, intraperitoneal use of local anesthetics, especially bupivacaine for pain relief after LC, is still controversial [5–10].

After the approval of the project by the Institutional Review Board of Surgery Department of Ankara University Medical School and with the informed consent of the patients, 50 adult elective LC patients were randomly allocated into two groups by envelopes. The inclusion criteria were, American Society of Anesthesiologists (ASA) I-II uncomplicated patients with symptomatic gall stone disease, who did not have a history of diabetes mellitus, prior abdominal surgery, allergy to bupivacaine, or prior exposure to chronic corticosteroid therapy, nonsteroidal anti-inflammatory or immunosuppressive drugs. Exclusion criteria specific to gall bladder disease and its treatment included gall bladder perforation and bile contamination of the peritoneum, surgical manipulation that necessitated the elongation of the incision at one of the trocar sites (e.g., stone extraction, open laparoscopy, and hemostasis of the port sites), repeated trocar entry attempts more than twice, overt intra-abdominal adhesions with the need for extensive surgical dissection or conversion to open surgery, and any surgical complication that required further medical or surgical intervention.

General anesthesia was induced with intravenous propofol 2 mg/kg and alfentanil 10 µg/kg and maintained with isoflurane/nitrous oxide in oxygen inhalation in all patients. Rocuronium was administered to facilitate endotracheal intubation and muscle relaxation as required. Ondansetron 4 mg intravenously was administered preoperatively. Bupivacaine 0.25% (20 cc) was used to infiltrate port sites prior to trocar insertion. The first 10 mm trocar was directly inserted below the umbilicus, another 10 mm trocar 2 cm below the xyphoid process, and two 5 mm subcostal trocars, one in the mid-axillary line and the other in the anterior axillary line, were inserted under the vision of the laparoscope. Cystic duct and artery were occluded by titanium clips. Electrocautery was used when necessary. Two senior surgeons performed all operations. Intra-abdominal pressure was kept constant at 12 ± 1 mm Hg with continuous CO₂ insufflation.

Before the removal of trocars and desufflation, 30 cc bupivacaine 0.25% (Group 1) or 30 cc saline solution (Group 2) was administered to the upper surface of the liver, right subdiaphragmatic space, gall bladder bed, and the hepatoduodenal ligament. Fifty envelopes were prepared at the beginning of the study (25 placebo, 25 bupivacaine). An independent investigator prepared the drug and placebo in regard to the randomly selected envelopes and collected the data inside the same envelope. Surgical and anesthesiology teams were blind to the contents. The same blinded investigator performed postoperative follow-up of the patients at 30 minute, 1, 2, 4, 6, 8, 12, and 24 hours. No routine analgesic was given postoperatively. Postoperative pain management was conducted according to the analgesic demand of the patient and the clinical judgment of the follow-up team. Patients were discharged afterwards and telephone contact was used to record their status at 48 hours...
postoperatively. Visual analog scale (VAS) and numeric pain scale (NPS) scores, total analgesic consumption (nonsteroidal anti-inflammatory drugs and meperidine), nausea, and vomiting were recorded at the follow-up intervals. At the end of the study, envelopes were opened and statistical analysis was performed by Student’s t-test and $\chi^2$-test where appropriate. $P < 0.05$ was considered as significant difference.

Demographic data, duration of the operation and recovery profile concerning age, body surface area, male/female ratio, surgical and anesthesia duration time were similar in both groups ($P > 0.05$) (data are not shown). There was no statistically significant difference between the groups in terms of response to painful and verbal stimulus at the completion of anesthesia ($P > 0.05$) (data are not shown). None of the operations necessitated conversion to open surgery and none of the patients was excluded from the study. The distribution of mean total analgesic consumption in the two groups was not significantly different ($P > 0.05$): in Group 1 (bupivacaine) the distribution was 120 mg metamizol in three patients, 16 mg meperidine in seven patients; in Group 2 (saline) the distribution was 280 mg metamizol in three patients, 16 mg meperidine in nine patients. Two patients in Group 1 and one patient in Group 2 complained of nausea and vomiting was observed in one patient of each group. Overall, there were no differences between the groups in terms of analgesic consumption and incidence of nausea and vomiting ($P > 0.05$). No side-effect due to administration of bupivacaine was recorded. Mean VAS scores were similar postoperatively between two groups ($P > 0.05$) (Figure 1), as were mean NPS scores ($P > 0.05$).

The success of local anesthetic infiltration with long duration of action at the trocar sites where the analgesic effect of the agent continues several hours after the completion of the surgical procedure led to the decision to use intraperitoneal local anesthetics to improve postoperative pain originating from the abdominal viscera. Lidocaine, mepivacaine, and ropivacaine have been used for pain relief in some studies. Nevertheless, the most popular local anesthetic used intraperitoneally for postoperative pain relief is bupivacaine because of its long duration of analgesic action and high potency [11]. Although LC, as a minimally invasive procedure with a total combined abdominal incision length of 2 cm, is both theoretically and reportedly less painful than open cholecystectomy as far as the pain originating from the abdominal wall is concerned, prospective data demonstrates that the use of local anesthetics in trocar sites results in statistically significant improvement in postoperative pain relief [4,5]. On the other hand, the extent of intraperitoneal dissection and the magnitude of pain originating from the abdominal viscera are similar in open and laparoscopic procedures. Therefore, if the use of local anesthetics at skin and abdominal wall was found to be effective, perhaps intra-abdominal use of local anesthetics could be effective as well. However, 30 cc bupivacaine 0.25% squirted on the upper surface of the liver, right subdiaphragmatic space, gall bladder bed, and the hepatoduodenal ligament did not produce an additional benefit with regard to postoperative pain relief in our study. Bupivacaine might have relatively lower intraperitoneal tissue penetrance, and therefore subtherapeutic concentrations, because it could be rapidly removed from diaphragmatic surfaces by gravity to the subhe-

![Figure 1](https://academic.oup.com/painmedicine/article-abstract/7/6/539/1868972/6835464) Mean visual analog scale (VAS) scores of the groups concerning time. $P > 0.05$. 

**Figure 1**
patic area or by the blood stream and diaphragmatic stomata [11,12].

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References