



Intraperitoneal analgesia for laparoscopic cholecystectomy

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Abstract

Background and Purpose: Although postoperative pain after laparoscopic cholecystectomy is less than open cholecystectomy, many patients still require strong analgesia postoperatively. Intraperitoneal administration of local anaesthetics alone or in combination with opioids can effectively control postoperative pain. The purpose of this study was to assess the analgesic effect of the intraperitoneal administration of bupivacaine and/or tramadol in patients undergoing laparoscopic cholecystectomy.

Patients and Methods: For this study, 144 patients undergoing laparoscopic cholecystectomy were randomized in one of four groups: Group C received 50 ml of saline, Group T received 50 ml of saline containing 100 mg tramadol, Group B received 50 ml of 0.25% bupivacaine while patients allocated to Group TB received 50 ml of 0.25% bupivacaine with 100 mg of tramadol intraperitoneally. Visual analogue scale was recorded half and hours, 1, 2, 4, 6 and 24 hours postoperatively. Incidence of postoperative nausea and vomiting (PONV) was also recorded. In addition, supplementary analgesic and antiemetic consumption were assessed.

Results: Pain intensity, PONV as well as postoperative supplementary medications were significantly lower in Group T, Group B and Group TB than in Group C. There were no differences between the three groups receiving tramadol and/or bupivacaine in VAS score, incidence of nausea and vomiting and postoperative analgesic and antiemetic consumption.

Conclusion: Intraperitoneal instillation of tramadol and/or bupivacaine is an effective method for management of postoperative pain after laparoscopic cholecystectomy. It significantly reduced supplementary postoperative analgesic and antiemetic medication.

INTRODUCTION

Laparoscopic cholecystectomy results in less postoperative pain as compared with open cholecystectomy, and pain may be mild or moderate or even severe for some patients. After laparoscopic cholecystectomy patients complain more of visceral pain as a result of stretching of the intraabdominal cavity, peritoneal inflammation and phrenic nerve irritation caused by residual carbon dioxide in the peritoneal cavity, whereas after open cholecystectomy the type of pain results mostly in parietal pain (1). Postoperative abdominal pain usually occurs during the first 24 hours, while shoulder pain most commonly appears the second day after laparoscopic cholecystectomy. Intraperitoneal (IP) administration of some drugs can be effective for relief of pain after lap-

aroscopic surgery. Some authors suggest that intraperitoneal instillation of drugs for pain relief is effective if used before creation of pneumoperitoneum (2) while others conclude that intraperitoneal drug administration is effective at the end of the surgery applied through a trocar (3).

The aim of this study was to evaluate the effect of intraperitoneal administration of tramadol and/or bupivacaine on pain relief in patients undergoing laparoscopic cholecystectomy.

PATIENTS AND METHODS

Before surgery all patients included in the study signed informed consent that was approved by the local ethic committee. One hundred and forty-four patients of ASA I, II and III status undergoing elective laparoscopic cholecystectomy for cholelithiasis were included in the study. Patients with contraindications to tramadol or bupivacaine, those who had to be converted to open cholecystectomy were excluded from the study. Standard operative method was used as described (4). For each patient demographic, perioperative and postoperative details were noted.

Patients were randomly assigned by a computer generated table into one of four groups. Patient allocated to Group C received 50 ml of saline IP; Group T received 50 ml of saline containing 100 mg tramadol, Group B received 50 ml of 0.25% bupivacaine while patients allocated to Group TB received 50 ml of 0.25% bupivacaine with 100 mg of tramadol. The surgeons did not know the treatment group until the end of the study.

Thirty minutes before surgery all patients received midazolam (7.5 mg orally per patient). General anesthesia was induced by intravenously administration of sufentanil (0.15–0.3 µg/kg) and propofol (2.5–3 mg/kg). Orotracheal intubation was facilitated by rocuronium (0.6 mg/kg i.v.). After intubation the patients were ventilated with intermittent positive-pressure ventilation by using a mixture of 1.5–2% sevoflurane, oxygen and air. Minute ventilation was adjusted to keep end-tidal pCO₂ at 4.5–5.5 kPa.

Fifteen minutes before the end of the surgery the patients received drugs, according to their allocation to the group, into the hepatodiaphragmatic space, near and above the hepato-duodenal ligament and above the gall

bladder bed under direct vision. All patients stayed in PACU after surgery for two hours. The intensity of the pain was recorded for all patients using visual analogue score (VAS) at 0.5, 1, 2, 4, 6 and 24 hours after surgery. Analgesia requirements were also recorded. If the VAS score was greater than 3, the patient was prescribed opioid (meperidine 50 mg i.v.). If the VAS score was below 3 nonsteroidal anti-inflammatory drugs (NSAID; diclofenac: 75 mg i.v.) was prescribed. Data were collected on the occurrence of postoperative nausea and vomiting. For the patients who experienced PONV, metoclopramide (10 mg) was given intravenously.

To calculate the sample size, we considered the results of our previous study (5). A total of 35 patients for each group were required to detect the designed difference in the VAS score, accepting a two tail α error of 5% and β error of 20%.

Results are reported as mean \pm SD. Data were analyzed by two-way analysis of variance. Demographic data were studied using Student’s t-test, whereas differences in the incidence of PONV were studied using χ^2 test. Pain score for both groups were compared using the Kruskal-Wallis and Mann-Whitney U-test. Results were considered statistically significant at the 5% critical level ($p < 0.05$). Data were analyzed with the statistical programme Statistica for Windows version 7.1 (StatSoft Inc, Tulsa, USA).

RESULTS

For this study, 144 patients were recruited. They were divided into four groups. There were no significant differences between groups according to sex, age, body weight and duration of operation (Table 1). No serious side-effects occurred in any group of patients.

The mean intensity of postoperative pain was significantly lower in Group B, Group T and Group TB than in Group C 0.5, 1, 2, 4, and 6 hours after the operation ($p < 0.05$) (Figure 1). There was no statistically significant difference in VAS score between Group B, Group T and Group TB at all time points (Figure 1).

The supplementary postoperative medication requirement was significantly higher in the control group compared to all other groups. Five patients in Group T, 6 patients in Group B and only 3 patients in Group TB

TABLE 1

Data from 144 patients who received IP saline (group C), tramadol (group T), bupivacaine (group B) or bupivacaine with tramadol (group TB) during laparoscopic surgery. Values are mean \pm SDa. Data of supplementary postoperative medications. * $p < 0.05$ was considered statistically significant.

| | Group C (n=36) | Group T (n=35) | Group B (n=37) | Group TB (n=36) |
|--|-------------------|-------------------|-------------------|--------------------|
| Sex ratio (F:M) | 19:17 | 20:15 | 20:17 | 21:15 |
| Age ^a (years) | 54.1 \pm 12.3 | 53.4 \pm 10 | 52.5 \pm 11.2 | 53.8 \pm 11.1 |
| Body weight ^a (kg) | 74.2 \pm 11.1 | 71.3 \pm 12 | 76.3 \pm 11 | 75.5 \pm 13 |
| Duration of operation ^a (min) | 72.8 \pm 16.5 | 74.6 \pm 22 | 75.5 \pm 18 | 73.3 \pm 21.1 |

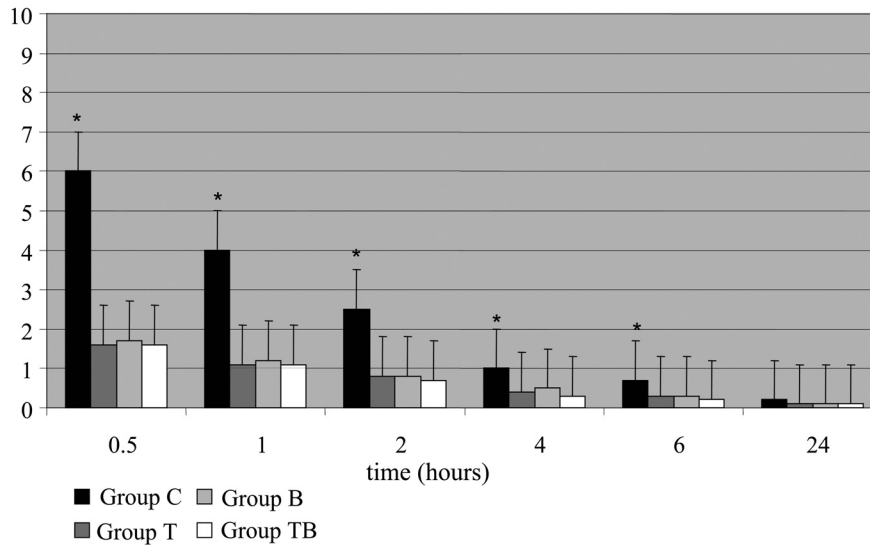


Figure 1. The effect of IP bupivacaine and bupivacaine with tramadol on pain using visual analog scale (VAS) at 0.5, 1, 2, 4, 6 and 24 hours after surgery. Values are mean \pm SD. * $p < 0.05$ was considered statistically significant.

required NSAID for pain relief. Opioid consumption was recorded only in Group C (Table 2). A considerably high number of the patients in Group C received antiemetic drug (metoclopramide was required by 32 patients in Group C, 4 patients in Group T, 2 patients in Group B and only one in Group TB; $p < 0.05$) (Table 2).

In Group C thirty-five patients experienced nausea and 16 patients vomited, whereas 6 patients in Group T and Group B and 3 patients in Group TB had nausea while 3 patients in Group T, 2 patients in Group B and only one patient in Group TB experienced vomiting ($p < 0.05$) (Table 3).

DISCUSSION

In our study we showed that intraperitoneal administration of bupivacaine and/or tramadol resulted in much lower pain scores, the incidence of PONV and less supplementary analgesic consumption in patients undergoing laparoscopic cholecystectomy.

Over a decade, clinical trials were designed to determine the benefit of local anaesthetics and opioids, presumably bupivacaine and morphine, administered intraperitoneally after laparoscopic cholecystectomy. Some investigators found that IP bupivacaine was effective in

TABLE 2

Data of supplementary postoperative medications in patients studied. * $p < 0.05$ was considered statistically significant.

| Medications | Group C | Group T | Group B | Group TB |
|----------------|---------|---------|---------|----------|
| NSAID | 35* | 5 | 6 | 3 |
| opioids | 30* | 0 | 0 | 0 |
| metoclopramide | 32* | 4 | 2 | 1 |

TABLE 3

Nausea and vomiting frequencies in patients studied. * $p < 0.05$ was considered statistically significant.

| Patients | Group C | Group T | Group B | Group TB |
|----------------------------------|---------|---------|---------|----------|
| Number of patients with nausea | 35* | 6 | 6 | 3 |
| Number of patients with vomiting | 16* | 3 | 2 | 1 |

pain reduction, while others showed that it did not attenuate pain following laparoscopic surgery (6, 7, 8, 9, 10).

Hernandes-Palazon *et al.* found that IP administration of local anaesthetic (bupivacaine) in combination with an opioid (morphine) reduced the analgesic requirements during the first 6 postoperative hours, and that a combination is more effective for treatment of pain after laparoscopic cholecystectomy (11).

Recently, Akinci *et al.* showed that intravenous tramadol provides superior postoperative analgesia compared with an equivalent dose of tramadol administered intraperitoneally in patients undergoing laparoscopic cholecystectomy (12). On the contrary, Memis *et al.* found that intraperitoneal tramadol and bupivacaine are very effective for postoperative analgesia in patients undergoing laparoscopic tube ligation (13).

In our previous study we found that intraperitoneal administration of tramadol had valuable implication in reducing pain for patients undergoing laparoscopic cholecystectomy (5).

This study showed that intraperitoneal application of tramadol or bupivacaine alone or in combination reduced pain for the first six hours after surgery. It also

helped to decrease postoperative non-steroid drug and opiate consumption. Intraperitoneal administration of tramadol and/or bupivacaine significantly reduced nausea and vomiting which helped realization of earlier recovery and discharge from the hospital. This finding has demonstrated that both drugs are equally effective and safe for patients undergoing laparoscopic procedures.

In conclusion, intraperitoneal analgesia with bupivacaine or tramadol alone or in combination is simple to use and effective in a reduction of pain and therefore recommended in patients undergoing laparoscopic cholecystectomy.

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