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Preemptive analgesia installation during gynecologic laparoscopy: A randomized trial

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KEY WORDS
Intraperitoneal bupivacaine;
Gynecologic laparoscopy;
Pain;
Visual analog score

Abstract

STUDY OBJECTIVE: To evaluate the efficacy of intraoperative infusion of bupivacaine solution for the relief of pain after operative gynecologic laparoscopy.

DESIGN: Prospective, double-blind, randomized, controlled trial (Canadian Task Force classification I4).

SETTING: Tertiary teaching hospital.

PATIENTS: Ninety-one women aged 16 to 69 years who underwent gynecologic laparoscopic surgery from November 2002 through November 2003.

INTERVENTIONS: Group A (n = 30): intraperitoneal infusion of a mixture of 10 mL of 0.5% bupivacaine (50 mg) with epinephrine (1:500) in 40 mL of Ringer's lactate solution postoperatively. Group B (n = 30): the same mixture solution infusion preoperatively and postoperatively (total 100 mg bupivacaine). Group C (n = 31): placebo.

MEASUREMENTS AND MAIN RESULTS: Shoulder tip pain (STP), abdominal parietal pain (APP), and abdominal visceral pain (AVP) were recorded on a visual analog scale at 2, 4, 8, 16, and 24 hours postoperatively. A total of 79 patients fulfilled the study criteria. The overall incidence of STP was 60.8%. Abdominal visceral pain in group B was significantly less than in group C at 2 and 4 hours postoperatively (p = .011 and p = .010, respectively). No statistically significant difference was found in length of hospital stay, postoperative meperidine consumption, or side effects.

CONCLUSION: Intraperitoneal bupivacaine administration both immediately after placement of trocars and at the end of surgery was found to be effective in reducing the intensity of AVP but not in reducing STP, APP, or postoperative analgesia consumption after nonadvanced gynecologic laparoscopic procedures. The duration of the analgesic effect of bupivacaine instilled into the peritoneal cavity did not exceed 8 hours and probably was not dose related.

It has been reported that 35% to 63% of patients undergoing laparoscopic surgery suffer pain, such as shoulder tip pain (STP) and abdominal pain.[1,2] Shoulder tip and abdominal pain after a gynecologic laparoscopic procedure remain unresolved, major short-term problems. It is believed that laparoscopic surgery–induced pain is of the referred type and is secondary to peritoneal stretching and diaphragmatic irritation. Thus, administration of intraperitoneal analgesics might minimize this pain. A preemptive analgesic, which achieves an afferent block

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before nociceptive stimuli are triggered, can reduce or eliminate the onset of hyperexcitability of the posterior horn neurons; therefore, it can significantly reduce both the intensity and duration of pain while also delaying its onset.[3–6]

One study[7] found that intraperitoneal ropivacaine before and after laparoscopic cholecystectomy significantly decreased both shoulder and parietal pain. Conversely, another study[8] noted that neither preoperative nor postoperative intraperitoneal bupivacaine treatment alone significantly reduced abdominal pain, incisional pain, or shoulder pain following laparoscopic cholecystectomy. In gynecologic laparoscopy, the association of intraperitoneal analgesic administration postoperatively with relief of pain remains controversial.[9–13] Limited data regarding the effects of preemptive analgesia in gynecologic operative laparoscopy have been compiled. In this study, we evaluated the efficacy of intraperitoneal bupivacaine solution administration immediately before and after gynecologic laparoscopy for the relief of STP, abdominal visceral pain (AVP), and abdominal parietal pain (APP).

Materials and methods

A double-blind, randomized, placebo-controlled study, approved by the local ethics committee, was conducted with 91 patients between the ages of 16 and 69 who underwent gynecologic laparoscopic surgery from November 2002 through November 2003. Patients were randomly assigned in a 1:1:1 ratio to the A, B, or C group at each clinical site, according to preprinted slips on sealed envelopes that had been prepared before the start of the study with a computer-generated randomization schema. All of the patients were classified as either grade I or II under the American Society of Anesthesiologists Physical Status. The laparoscopic procedures included electrocautery for pelvic endometriosis, tubal sterilization, adhesiolysis, ovarian cystectomy, and tubal reconstructive surgery. The exclusion criteria were as follows: a history of abdominopelvic laparotomy, severe endometriosis (American Fertility Society score of greater than 40 points), extensive pelvic adhesions, an operative time of more than 3 hours, ruptured ectopic pregnancy with hemoperitoneum, active intraperitoneal infection with concomitant culdotomy, and insertion of a postoperative drainage tube. Preoperative informed consent was obtained.

General anesthesia

Anesthesia was induced with intravenous thiopental (5 mg/kg) and fentanyl (0.1 mg). Orotracheal intubation was facilitated by intravenous succinylcholine (1 mg/kg). General anesthesia was further maintained with low-flow desflurane in 500 mL/min oxygen. Atracurium was used as a muscle relaxant.

Peritoneal topical anesthesia

Before induction of anesthesia, patients were randomized into one of three groups. As well as the patient, neither the surgeon nor the assessor of pain was aware of the solution administered. A conversion to the abdominal approach was made immediately for patients with severe pelvic adhesions. The laparoscopic technique and abdominal wall penetration locations were standardized, as previously described.[14] Trocar insertion was limited to three punctures: one 10-mm trocar infra-umbilically and two 5-mm trocars suprapubically.

After the patient was placed in the Trendelenberg position, one of three procedures was followed. Patients in group A received an intraperitoneal infusion of 50 mL of Ringer's lactate solution immediately after trocar insertion (preoperatively) and an intraperitoneal infusion of a mixture of 10 mL 0.5% bupivacaine (50 mg) with epinephrine (1:500) in 40 mL of Ringer's lactate solution at the end of surgery (postoperatively). Patients in group B received the same mixture of 10 mL of 0.5% bupivacaine with epinephrine (1:500) in 40 mL of Ringer's lactate solution as an intraperitoneal infusion preoperatively and postoperatively (total 100 mg bupivacaine). Patients in group C (control group) received an intraperitoneal infusion of 50 mL of Ringer's lactate solution preoperatively and postoperatively. All of the laparoscopic procedures were performed by either a senior resident or an attending physician. Intra-abdominal pressure was maintained by insufflation of CO_2 at 15 mm Hg. Intraperitoneal local administration of analgesic or placebo solution was left in situ for at least 5 minutes. Under direct vision, the surgeon used an irrigator to infuse 30 mL of solution into the subdiaphragmatic space (15 mL on the right and 15 mL on the left) and 20 mL into the pelvic cavity. At the conclusion of the procedure, as much CO_2 as possible was removed from the peritoneal cavity. Laparoscopic entrance wounds were not infiltrated with any of the local anesthetic solution.

Postoperative management

Blood pressure, heart rate, and respiratory rate after surgery were recorded at 2-hour intervals. Postoperative analgesia was prescribed: meperidine 50 mg intramuscularly every 4 hours as needed immediately after surgery and oral acetaminophen 500 mg four times a day, 6 to 8 hours postoperatively. In cases of severe nausea and/or vomiting, prochlorperazine 5 mg intramuscularly every 4 hours was prescribed. The degree of postoperative STP, AVP (defined as deep in the abdomen with poor localization), and APP (defined as abdominal wall, incisional pain with a fixed pattern) was assessed using a visual analog pain scale (VAS) with the patient resting in the supine position at 2, 4, 8, 16, and 24 hours postoperatively. The VAS, with scores ranging from zero (no pain) to 10 (unbearable pain), was constructed without numeration, allowing patients to mark a