Journal of Clinical Anesthesia 49 (2018) 112–117

Contents lists available at ScienceDirect

Journal of Clinical Anesthesia

journal homepage: www.elsevier.com/locate/jclinane

Original Contribution

Ultrasound-guided posterior quadratus lumborum block for postoperative pain after laparoscopic cholecystectomy: A randomized controlled double blind study

Korgün Ökmen, M.D.[a,*], Burcu Metin Ökmen, M.D.[b,1], Serra Topal, M.D.[a,2]

[a] University of Health Sciences, Bursa Yuksek Ihtisas Training and Research Hospital, Department of Anesthesiology and Reanimation, Bursa, Turkey
[b] University of Health Sciences, Bursa Yuksek Ihtisas Training and Research Hospital, Department of Physical Medicine and Rehabilitation, Bursa, Turkey

ARTICLE INFO

Keywords:
Quadratus lumborum block
Nerve block
Laparoscopic cholecystectomy
Ultrasonography

ABSTRACT

Study objective: Laparoscopic techniques are commonly used in surgical operations of the gallbladder. There are very few regional anesthesia methods used to achieve this goal. We aimed to investigate the effect of ultrasound-guided posterior quadratus lumborum block (QLB), administered bilaterally on pain scores after laparoscopic cholecystectomy operations.
Design: Prospective, double blind, randomized controlled clinical trial.
Setting: Single-institution, tertiary hospital.
Patients: 60 patients underwent laparoscopic cholecystectomy were included in the study.
Interventions: Patients were randomized to either Group B (intravenous patient-controlled analgesia (IV PCA) + posterior QLB with 0.3 ml/kg 0.25% bupivacaine; n = 30) or Group S (IV PCA + posterior QLB with 0.3 ml/kg 0,9% saline; n = 30).
Measurements: Postoperative pain (during rest) was evaluated at the 30th minute, 2nd, 6th, 12th, and 24th hours using the VAS scores. Postoperative activity pain was also evaluated with VAS at the 2nd, 6th, 12th, and 24th hours. Postoperative 6th, 12th, and 24th hour follow-up results were recorded to identify the quantity of tramadol use. Secondary outcomes included the Ramsey sedation scale (RSS), side effect profile, and additional analgesic use.
Main results: The VAS scores between the two groups were found to be statistically significantly lower in Group B ($p < 0.001$). The mean values of the quantity of tramadol use at the 6th, 12th, and 24th hours were found to be statistically significantly lower in Group B ($p < 0.001$). There was no statistically significant difference in the rate of side effects ($p = 0.309$) and RSS ($p = 0.505$) outcomes between the groups.
Conclusions: As a result of this study, we think that posterior QLB administered for pain palliation after laparoscopic cholecystectomy operation is an effective analgesia technique.

1. Introduction

Recently, laparoscopic techniques are common use in surgical operations that involved the gallbladder. Although the level of pain from the incision is lower than in open surgical management, the abdominal tension from the pneumoperitoneum that is performed as part of the surgical intervention, and surgical interventions into the hepatorenal recess, may cause severe postoperative pain [1]. Intravenous nonsteroidal anti-inflammatory drugs (NSAIDs), opioids and local anesthetic infiltrations (for peritoneum and skin incisions), as well as regional anesthesia techniques, include epidurals (thoracic) and truncal blocks (transversus abdominis plane block) can be used for the treatment of postoperative pain [2].

The quadratus lumborum block (QLB) is a recently described regional block that was first described by Blanco et al., but would appear to be similar to the posterior transversus abdominis plane (TAP) block,

* Corresponding author at: University of Health Sciences, Bursa Yuksek Ihtisas Training and Research Hospital, Department of Anesthesiology and Reanimation, Mimar Sinan Quarter, Emniyet Street, 16130 Bursa, Turkey.
E-mail address: korgunokmen@gmail.com (K. Ökmen).
[1] University of Health Sciences, Bursa Yuksek Ihtisas Training and Research Hospital, Department of Physical Medicine and Rehabilitation, Mimar Sinan Quarter, Emniyet Street, 16130 Bursa, Turkey.
[2] University of Health Sciences, Bursa Yuksek Ihtisas Training and Research Hospital, Department of Anesthesiology and Reanimation, Mimar Sinan Quarter, Emniyet Street, 16130 Bursa, Turkey.

https://doi.org/10.1016/j.jclinane.2018.06.027
Received 29 January 2018; Received in revised form 3 June 2018; Accepted 8 June 2018

although the drug injection area is deeper and more dorsal than the transverse abdominal aponeurosis [3,4]. This block has been shown to be able to spread over the paravertebral area due to the anatomical structure when administered between the quadratus lumborum (QL) muscle and the medial leaf of the thoracolumbar fascia [3,5]. In this way, it has been reported to provide good analgesia, providing better relief from the somatic pain associated with upper and lower abdominal surgeries [6]. The QLB block, which is used for different types of surgery in our day, can be administered laterally, posteriorly and transmuscularly, and intramuscularly, according to the injection site and the anatomical position of the QL muscle [3].

In this study, we investigate the effects of ultrasound-guided QLB, administered bilaterally to the posterior of the QL muscle, on pain scores after laparoscopic cholecystectomy operations. Our hypothesis in this study is that patients who receive QLB record lower Visual Analogue Scale values during rest and activity than the placebo group.

2. Patients and methods

2.1. Patients

In this prospective, randomized controlled, double-blind study, 70 patients due for laparoscopic cholecystectomy surgery were evaluated within the scope of this study after local ethics committee approval was received and clinical trial records were registered (Uludag University Faculty of Medicine Clinical Research Ethics Committee, Ethical number: 2011-KAEK-25 2017-13/69, ClinicalTrials.gov identifier: NCT03308955).

Inclusion criteria: American Society of Anesthesiologists (ASA) I–III-class patients aged between 20 and 70 years, who had undergone elective laparoscopic cholecystectomy operations, were included in this study. Exclusion criteria were as follows: Previous history of preoperative opioid use, body mass index (BMI) > 35, allergy to local anesthetics, the presence of any systemic infection, uncontrolled arterial hypertension and uncontrolled diabetes mellitus.

A total of 60 patients who met the criteria reported above agreed to participate in this study and provided written informed consent (Group B (n = 30): Ultrasound-guided posterior QLB with 0.3 ml/kg 0.25% bupivacaine + IV patient-controlled analgesia (PCA) tramadol; Group S (n = 30): Ultrasound-guided posterior QLB with 0.3 ml/kg 0.9% saline + IV patient-controlled analgesia [PCA] tramadol), were randomized using a random number table (Fig. 1).

2.2. Anesthetic and analgesic management

2.2.1. Bilateral QLB

Before the administration of general anesthesia, IV Midazolam: 0.03 mg/kg was administered to the patients transferred to the block room. After placing the patient in the lateral position, the intervention area was disinfected. A linear probe (10–18 MHz, MyLab30; Esaote, Florence, Italy) was placed on the anterior-superior iliac crest and moved in the cranial direction until the external oblique, internal oblique and transversus abdominis were observed in the form of three layers on the lateral abdominal wall. Then, the probe was directed posteriorly, and the QL muscle and thoracolumbar fascia were observed in the area where the three muscular layers end [7]. A 22-gauge, 100-mm needle (Stimuplex Ultra B.Braun, Melsungen, Germany) was directed to the posterior of the QL muscle using the in-plane technique. After confirming the site by hydrodissection, Group B was injected with 0.3 mg/kg bupivacaine 0.25%; and Group S was injected with 0.3 mg/kg/0.9 saline between the QL muscle and medial thoracolumbar fascia (Fig. 2). The patients in both groups did not know which injection was made. All block applications were made by an experienced anesthesiologist who was familiar with ultrasound-guided block applications due to ensure the standardization of the block procedure. In addition in laparoscopic operations, intraabdominal gas insufflation may cause tension and pain throughout the postoperative period. So we applied the QLB bilaterally to control all the abdominal pain.

Around 10 min after the block was administered, standard monitoring was carried out on the patients transferred to the operating room. Before induction, a 0.9% NaCl infusion was initiated intravenously, and the patients were preoxygenated with 100% oxygen (O_2) for 3 min. Intravenous propofol and rocuronium bromide were used for the induction. After the intubation, mechanical ventilation was performed, maintaining the end-tidal CO_2 (ETCO2) at 30–35 mm Hg. During the maintenance of anesthesia, Sevoflurane (1–2.5%) was administered in 50% air and 50% O_2 mixture at a flow rate of 2.5–3 L/min.

2.2.2. Surgical procedure

All patients underwent surgery with 4 trocar techniques. During the operation, CO_2 insufflation was performed with intraabdominal pressure of 14 mm Hg. Intraoperative complications that can prolonged the operation time and additional pain sources were classified as bleeding of the anterior wall of the abdomen and intraabdominal injury during port entry, surgical area adhesiveness, other organ injuries (duodenum, other intestinal segments) and vascular injuries that occurred during the procedure and they were recorded.

Analgesia was provided with 1 μg/kg fentanyl in required patients, and 10 min before the end of the operation, Tenoxicam 20 mg IV was given. After this procedure, IV PCA was applied, and the bolus dose of tramadol was administered.

2.2.3. IV PCA protocol

A 4 mg/ml tramadol-added saline solution was installed on the PCA device in Group B and Group S. The device was adjusted to a bolus dose of 0.3 mg/kg, a lockout interval of 20 min and a demand dose of 10 mg. While the maximum daily dose was 400 mg, the allowed dose per 6 h was planned as 100 mg. The patients recurarized at the end of the operation and were transferred to the recovery room after being extubated. When VAS > 5, for the additional analgesic requirement, 1 g paracetamol was ordered to be given at eight-hour intervals.

2.3. Outcome measures

2.3.1. Primary measures

VAS scores during rest (end of operation 30th min, 2nd, 6th, 12th and 24th hour), VAS scores during activity and the amount of tramadol consumption 2nd, 6th, 12th and 24th hour were investigated. Secondary measures: Side effects (such as nausea and vomiting, itching, respiratory depression, bradycardia, hypotension), additional analgesic requirement, intraoperative opioid requirement and Ramsey sedation scores (RSS) were investigated. After the block, the level of sensory block at the 10th minute was evaluated in QLB patients.

The patients were informed about VAS score questioning before the operation and the Visual Analogue Scale was explained. The patients were asked to mark the level of pain they feel on the 10 cm line. They marked the level of feeling of their pain on the line with their own hands. The VAS scoring standards inactivity are the questioned pain values that result from turning to the right and left in the bed, by sitting and difficult inspirium during the first postoperative 6 h; and in mobilized patients after the 6th hour, the questioned of pain score detected after walking five steps. The VAS score values during rest were considered as those while the patient was in a 30 degree-sitting and supine position in the bed.

Evaluations of the patients were made by another investigator who did not know which group the patients were in.

2.4. Statistical analysis

In addition to the descriptive statistical techniques (frequency, percentage, mean, standard deviation, median, min-max), a Chi-square