Randomized Controlled Trial

Regional Analgesia for Laparoscopic Cholecystectomy Using Ultrasound-guided Quadratus Lumborum Block or Erector Spinae Block: A Randomized Controlled Trial

Ahmed Hassanein, MD, Mohamed Abdel-Haleem, MSc, and Shadwa R. Mohamed, MD

From: [1]Department of Anesthesia, Intensive Care and Pain Management, Minia University

Address Correspondence:
Ahmed Hassanein, MD
Department of Anesthesia, Intensive Care and Pain Management, Minia University
33 Algeesh St., Minia, Egypt
E-mail: ahmedhassanein10@yahoo.com

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Background: Postoperative pain increases the incidence of venous thrombosis and respiratory complications, prevents early postoperative ambulation, and prolongs hospital stay. Fascial plane injections such as erector spinae plane (ESP) block and quadratus lumborum (QL) blocks are popular methods for postoperative pain control and reducing opioid consumption.

Objectives: We aimed to evaluate the analgesic effects of ultrasound-guided ESP versus QL block during laparoscopic cholecystectomy for the reduction of pain and analgesic consumption.

Study Design: Prospective, double-blind, single-center, randomized controlled clinical trial.

Setting: Minia University Hospital, Minia Governorate, Egypt.

Methods: Patients scheduled for laparoscopic cholecystectomy from April 2019 through December 2019 were randomly allocated into 3 groups. After induction of general anesthesia, Group A received an ESP block, group B received a QL block, and group C didn't receive any block (control). The main outcome was the time to the first analgesic request. Secondary outcomes were the pain intensity measured by the Visual Analog Scale at one, 2, 4, 6, 8, 12, 16, 20, and 24 hours postoperatively at rest and cough. The total analgesic requirement during the first 24 postoperative hours, hemodynamics, and any complications were recorded.

Results: Sixty patients scheduled for elective laparoscopic cholecystectomy were enrolled; the clinical and demographic data were similar in the 3 groups. Groups A and B had lower VAS scores at cough than Group C in the first postoperative 2 hours. Compared to Group C, a higher score was reported at 8, 12, and 16 hours in Group A, and at 8 and 16 hours in Group B. Group B had a higher score at 4 hours than Group A. At rest, Group C showed higher scores than Groups A and B in the first 2 hours, while higher scores were noted at 16 hours in Group A and 12 hours in Group B. Time to first request of analgesia was significantly prolonged in Group A than in Groups B and C ($P < 0.001$). Our study showed that Groups A and B had lower postoperative analgesic requirements than Group C ($P < 0.05$).

Limitations: This study had a small number of patients enrolled.

Conclusions: Both ESP and QL blocks effectively reduced VAS scores at both cough and rest. There was a decreased total consumption of analgesics in the first postoperative 24 hours with a longer duration of analgesia, which lasted 16 hours in the ESP group and 12 hours in the QL group.

Key words: Plane nerve block, cholecystectomy, postoperative pain, regional analgesia

Clinical trial number: NCT 04689633

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Ultrasound provides a safe and easy way for interfascial plane nerve block. Many new ultrasound-guided interfascial muscle plane nerve blocks have been discussed by anatomical studies (1). The ultrasound-guided erector spinae plane (ESP) block technique was first described by Forero et al (2) in 2016 for the control of chest wall neuropathic pain. This technique provides visceral and somatic analgesic effects when the local anesthetic reaches the paravertebral space containing ventral rami, rami communicans, and sympathetic fibers (3). The ultrasound-guided quadratus lumborum (QL) injection was originally demonstrated by Blanco (4) in 2007 as an efficient abdominal wall block, by which the local anesthetic spreads across the QL muscle and blocks the intermuscular nerves (4).

Following laparoscopic cholecystectomy, the source of postoperative pain may be parietal arising from the anterior abdominal wall, or visceral. Interfascial plane nerves located between the internal oblique and transversus abdominis muscles are responsible for the segmental sensory supply of the anterior abdominal wall. Opioids are mainly used for pain control postoperatively, however, they can result in serious adverse effects such as nausea, vomiting, sedation, ileus, and a prolonged postoperative hospital stay. Therefore, many techniques have been developed for controlling postoperative pain and reducing opioid consumption, including interfascial plane block (5).

Our study was designed to evaluate the efficacy and advantages of ESP block versus QL block in controlling postoperative pain after laparoscopic cholecystectomy by estimating the time to first analgesic requirement, the Visual Analog Scale (VAS) pain score, and the total amount of analgesics in the first 24 hours.

Methods

Patient Characteristics and Randomization

In this double-blind, prospective randomized study, 66 adult patients were selected. Patients were randomly assigned to 3 parallel equal groups, and were randomly assigned following simple randomization procedures (computerized random numbers) to one of the groups. The patients, anesthetists, and nurses involved in the study were blinded to group assignment.

Eligible patients were all 18-70 years old and weighed 50 kg-120 kg. All were scheduled for laparoscopic cholecystectomy at our institution (Minia University Hospital) from April 2019 through December 2019. Their ASA (American Society of Anesthesiologists) physical status was I/II. Patients with allergies to the tested medications, psychological disorders, opioid dependency, infection at the block site, and refusal of participation were the main cause of exclusion from the trial. After approval of the institutional ethical committee and online registration in ClinicalTrials.gov (NCT 04689633), written informed consent was obtained before enrolment.

Anesthesia, Interventions, and Monitoring

Patients in Group A received an ultrasound-guided ESP block bilaterally by injecting 20 mL bupivacaine 0.25% (on each side), while patients in Group B received an ultrasound-guided QL block bilaterally by injecting the same dose of bupivacaine 0.25%. Patients in Group C did not receive any nerve block.

Equipment used included an ultrasound (FUJIFILM Sonosite, Inc.) with a linear or curved probe depending on the depth, a 25-gauge spinal needle, 10 mL injection syringes, sterile gloves, extension lines, sterile probe covers, and sterile towels. A thorough medical history was taken, and a thorough physical examination was performed. Laboratory investigations including hemoglobin, complete blood count, and coagulation profiles. After surgery, all patients learned to use the VAS to assess their level of pain. In the operating theater electrocardiogram, non-invasive intraarterial blood pressure, pulse oximetry, and end-tidal carbon dioxide (CO_2) were connected to all patients as standard monitoring. A 20G intravenous cannula was inserted and each patient received 20 mL/kg Lactated Ringer's as a preload and 0.05 mg/kg midazolam ,then preoxygenation with 100% oxygen for 3 minutes by a well-fitted face mask.

Anesthesia was induced by fentanyl (1 µg/kg) and propofol (2 mg/kg); Skeletal muscle was relaxed with 0.5 mg/kg atracurium. Maintenance was done by isoflurane 1%-2% with oxygen, and 0.15 mg/kg intermittent doses of atracurium. Controlled ventilation settings were adjusted to have end-tidal CO_2 of about 35-40 mm Hg and arterial oxygen saturation (SaO_2) of 96-100%.

Following hemodynamic stability, ESP and QL blocks were conducted by the same anesthesiologist who was blind to the study groupings and randomization. The patient was placed either prone (for an ESP block) or lateral decubitus (for a QL block).

In Group A, the ESP block, with the patient prone, sterilization and draping were carried out followed by local infiltration of 3 mL of 1% lidocaine. Either a linear

or curved ultrasound probe was placed longitudinally according to depth 3 cm lateral to the T8-T9 spinous line. When the trapezius and erector muscles were located superficial (posterior) to the hyperechoic transverse process (TP) shadow, a 22G German spinal needle was inserted in a cephalocaudal direction until it gently hit the TP and its tip was in the fascial plane between the erector muscles and the TP. The correct placement of the tip was confirmed by the observable linear spread of local anesthetic under erector spinae muscle that separates it from the TP. Repeated aspiration was done to avoid intravascular injection. The other side was injected in the same manner. Each side received a total of 20 mL of 0.25% bupivacaine.

In Group B, the QL block, bilateral posterior QL blocks were done. According to the depth, either a linear 25N multi-frequency 13-6MHz transducer or curvilinear low-frequency 60N multi-frequency 5-2 MHz transducer probe was used. A low-level disinfectant was employed on the probe and a sterile gel was then placed just above the iliac crest in the midaxillary transverse plane. In dorsal sliding of the probe, the "shamrock sign" was cleared. At the apex of the TP of the L4 superior leaf made by the QL muscle, the psoas major muscle makes the anterior leaf while erector spinae muscles make up the posterior leaf and the 3 leaves connected to the TP. From the posterior end of the probe, a 22G German spinal needle was directed through the QL muscle to the fascial plane between this muscle and the psoas major muscle (QL3). Once the correct location of the needle tip was confirmed, and after negative aspiration of blood, the solution was injected. Each side received a total of 20 mL of 0.25% bupivacaine.

A surgical procedure was started 15 minutes after the blocks. If the patient's hemodynamics increased by 20% from the basal values, 0.5 μg/kg of fentanyl was supplemented. Before the operation ended, an intravenous infusion of 1 g of acetaminophen was administered to all patients. Neuromuscular blockade reversal was achieved by 50 μg/kg neostigmine and 0.01 mg/kg atropine. The patients were then transferred to the recovery unit and discharged from it when their Aldrete score ≥ 8. A ketorolac 30 mg ampule was administered to all patients and then every 8 hours, their pain was assessed by the VAS where 0 cm refers to no pain and 10 cm refers to the worst pain. Fentanyl 1 μg/kg was given when the VAS score was > 3. The measurement was repeated every 30 minutes until the VAS score became ≤ 3. The subsequent fentanyl doses were 0.25 μg/kg. Hemodynamics and SpO_2 were assessed before and after anesthesia induction and then after the block at 10 minute intervals for one hour and then every 15 minutes until the end of the surgery. Total fentanyl requirements were recorded.

Outcomes Measurements

The primary endpoint of the study, time to the first analgesic requirement, was recorded for each patient. Secondary outcomes recorded were total consumption of fentanyl, and pain intensity measured by the VAS at one, 2, 4, 6, 8, 12, 16, 20, and 24 hours postoperatively at rest and cough. The occurrence of any complication from each technique was recorded. All postoperative data were collected by an observer who was blinded to the groups.

Sample Size

Group size calculation was based on the results of a pilot study of 6 patients in each group. Using G Power 9.2 software (Heinrich Heine University), a total of 20 patients in each group were needed to provide 80% power for the analysis of variance (ANOVA) test at a significance level of 0.05. We planned to recruit 22 patients in each group in case there were any dropouts.

Statistical Analysis

Statistical calculations were done by IBM SPSS Statistics 20.0 (IBM Corp.). Quantitative data were expressed as mean and standard deviation (SD), while qualitative data were expressed as numbers and percentages. A one-way ANOVA test was used to compare the means of parametric quantitative data followed by post hoc Tukey correction. The χ^2 test was used to compare qualitative data. A *P* value less than 0.05 was considered significant.

Results

Patient Characteristics and Hemodynamics

Initially, 66 patients were recruited for the study, but 6 patients were excluded due to refusal to participate (n = 3), conversion to open cholecystectomy (n = 2), and failed nerve block (n = 1); 60 patients completed the study. Forty patients received an ultrasound-guided ESP or QL block and 20 patients (the controls) did not receive any block (Fig. 1). The 3 groups were comparable regarding demographic data and complications with nonsignificant differences (Table 1).

By comparing changes in heart rate in Groups A and B, most readings were lower in Group A with a significant

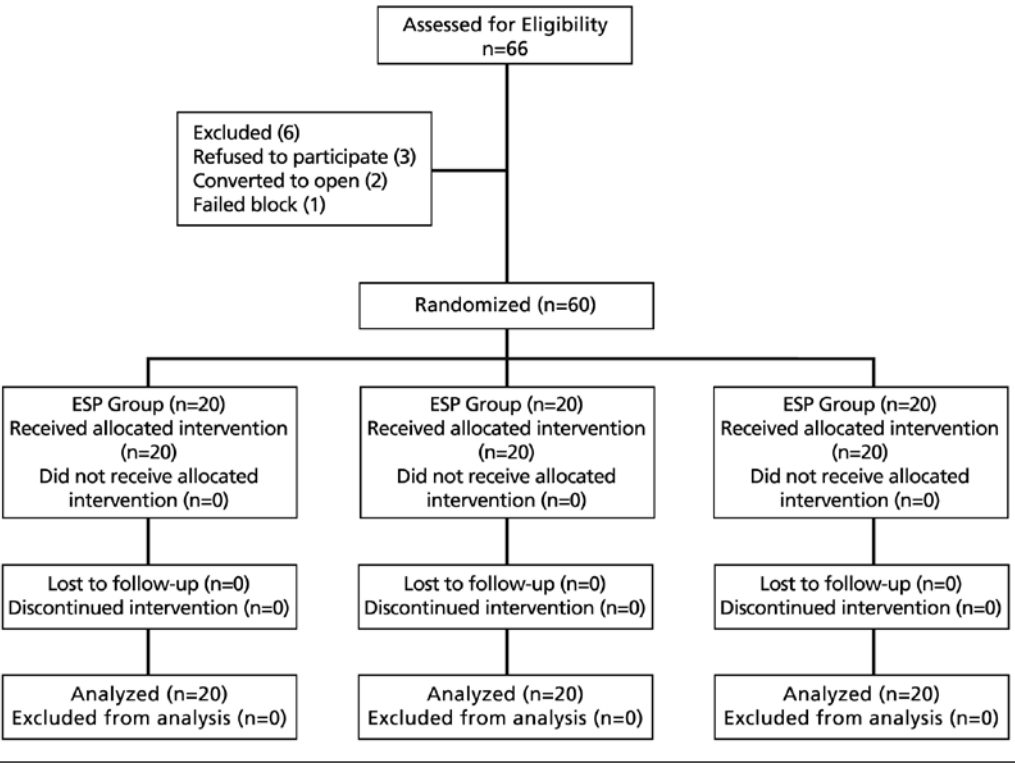

Fig. 1. *Study patients flow chart.*

Table 1. *Demographic data of the studied groups.*

Variables	Group A (n = 20)	Group B (n = 20)	Group C (n = 20)	*P* Value
Age (years)	37.3 ± 8.7	34.4 ± 9.2	40.6 ± 9.4	0.10
Weight (kg)	74.4 ± 9.0	73.4 ± 9.5	79.6 ± 8.3	0.07
Duration of surgery (min)	33.0 ± 3.7	33.2 ± 4	34.7 ± 2.4	0.20
Women	16 (80%)	18 (90%)	13 (65%)	0.10
ASA: Class I Class II	 14 (90%) 2 (10%)	 18 (90%) 2 (10%)	 14 (70%) 6 (30%)	0.10
Complications PONV Pruritus Combined Absent	 5 (25%) 4 (20%) 1 (5%) 10 (50%)	 3 (15%) 3 (15%) 4 (20%) 10 (50%)	 4 (20%) 3 (15%) 3 (15%) 10 (50%)	0.80

Data are expressed as mean and standard deviation or number and percent. ASA: American Society of Anesthesiologists. PONV: Postoperative nausea and vomiting.

reduction at 2 hours and 12 hours. By the time point 16 hours, the heart rate in Groups A and B became similar with no significant differences except at 16 hours the reading was higher in Group A. Regarding intragroup variations, Groups A and B showed a significant increase in heart rate at 8 hours and 12 hours while in Group C, the heart rate was higher at the first and second hour readings than at other postoperative time points (Table 2).

There was a significant reduction in mean arterial pressure (MAP) in Groups A and B than in Group C at one hour, 2 hours, 4 hours, 6 hours, and 8 hours (Table 3). The readings in Group A start to elevate by time point 16 hours and in Group B by time point 12 hours. By time points 12 hours, and 16 hours, the MAP readings in the 3 groups became more comparable, with slight differences until the end of the 24 hours. In group A, the MAP was 94.4 mm Hg ± 5 mm Hg at the first hour and then decreased significantly at 6 hours to 93.9 mm Hg ± 4.5 mm Hg then increased at 16 hours to 104.5 mm Hg ± 6.2 mm Hg with a *P* value of 0.0001. In group B, the MAP was (89.1 mm Hg ± 5.8 mm Hg) at one hour. A significant decrease occurred at 2 hours to 91.7 mm Hg ± 6.5 mm Hg and increased up to 102.8 mm Hg ± 10 mm Hg at 12 hours ($P < 0.001$). In Group C, the MAP was 106.5 mm Hg ± 12.4 mm Hg at one hour. Group C's MAP increased and decreased significantly at different postoperative periods ($P < 0.001$).

Primary and Secondary Outcomes

The time to the first analgesic request (Fig. 2) was significantly longer in Group A (13.5 ± 4.5 h) than in Groups B (8.7 ± 4.1 h) and C (1.3 ± 0.4 h) ($P < 0.001$) so the duration of analgesia was shorter in Group C (1.3 ± 0.4 h) when compared with Group A (11.2 ± 2 h) and Group B (10.0 ± 3.4) ($P < 0.001$). Postoperative fentanyl requirement was higher in group C (98.9 ± 34.1 µg/kg) than Group A (79.5 ± 21.2) and Group B (83 ± 19.6) with ($P = 0.04$). The 3 studied groups were comparable regarding recovery score and time of discharge from the recovery room.

Patients in Groups A and B had significantly lower VAS scores at cough than Group C at postoperative hours one and 2, while Group B showed higher VAS scores than Group C at postoperative hours 8, 12, and 16. Group A showed higher VAS scores at postoperative hours 8 and 16. At postoperative hour 4, Group B had a significantly higher VAS score than Group A.

At rest, Group C showed higher VAS scores than Groups A and B at postoperative hours one and 2. Group B had a higher VAS score than Group A at postoperative 12 hours, while Group A's VAS score was higher at postoperative hour 16. Due to the administration of analgesia, a significant difference was absent in intergroup comparisons at postoperative hours 6,

Table 2. *Postoperative changes in the heart rate (beat/min) in the studied groups.*

Timepoint	Group A (n = 20)	Group B (n = 20)	Group C (n=20)	*P* Value		
				P1	P2	P3
One hour	81.9 ± 4.5	80.7 ± 5.4	96.7 ± 9.7	0.80	0.0001*	0.0001*
2 hours	79.7 ± 7.8	83.3 ± 8.6	92.9 ± 9.3	0.40	0.002*	0.0001*
4 hours	82.3 ± 3.7	89.2 ± 8.1	85.6 ± 4.3	0.001*	0.10	0.10
6 hours	87.1 ± 3.7	88.5 ± 7.1	84.9 ± 6.7	0.70	0.10	0.50
8 hours	85.4 ± 10.1	90.5 ± 8.1	83.9 ± 6.8	0.10	0.04*	0.80
12 hours	88.9 ± 4.2	96.6 ± 9.7	90.4 ± 7.7	0.006*	0.03*	0.70
16 hours	101.8 ± 9.4	89.1 ± 6.0	87.6 ± 7.2	0.0001*	0.80	0.0001*
20 hours	91.0 ± 7.1	89.6 ± 6.8	91.4 ± 7.7	0.80	0.70	0.90
24 hours	84.0 ± 9.1	89.1 ± 6.3	88.6 ± 7.3	0.10	0.90	0.10
P value (in-group)	0.0001#	0.0001#	0.0001#	-	-	-

Data are expressed as mean and standard deviation. P1 (*P* value for comparison of group A and group B), P2 (*P* value for comparison of group B and group C), and P3 (*P* value for comparison of group A and group C) *: indicates significant difference for intergroup comparison #: indicates significant difference for intragroup comparison.

Table 3. *Postoperative changes in mean arterial pressure (MAP) in the studied groups.*

Timepoint	Group A (n = 20)	Group B (n = 20)	Group C (n = 20)	*P* Value		
				P1	P2	P3
One hour	94.4 ± 5.0	89.1 ± 5.8	106.5 ± 12.4	0.10	0.0001*	0.0001*
2 hours	95.4 ± 4.8	91.7 ± 6.5	102.2 ± 9.8	0.20	0.0001*	0.01*
4 hours	95.6 ± 3.8	97.6 ± 8.5	101.5 ± 7.02	0.60	0.10	0.02*
6 hours	93.9 ± 4.5	92.1 ± 5.9	94.9 ± 5.8	0.50	0.20	0.80
8 hours	97.9 ± 3.6	95.5 ± 5.2	100.8 ± 5.9	0.30	0.006*	0.10
12 hours	98.0 ± 3.3	102.8 ± 10.0	97.7 ± 5.5	0.08	0.05	0.90
16 hours	104.5 ± 6.2	92.6 ± 4.8	102.9 ± 8.7	0.0001*	0.0001*	0.70
20 hours	97.5 ± 5.2	94.6 ± 5.1	97.6 ± 7.5	0.20	0.20	0.90
24 hours	95.3 ± 5.1	96.4 ± 6.5	98.7 ± 8.2	0.80	0.50	0.20
P value (in-group)	0.0001#	0.0001#	0.0001#	-	-	-

Data are expressed as mean and standard deviation. P1 (*P* value for comparison of group A and group B), P2 (*P* value for comparison of group B and group C), and P3 (*P* value for comparison of group A and group C) *: indicate significant difference for intergroup comparison #: indicates significant difference for intragroup comparison.

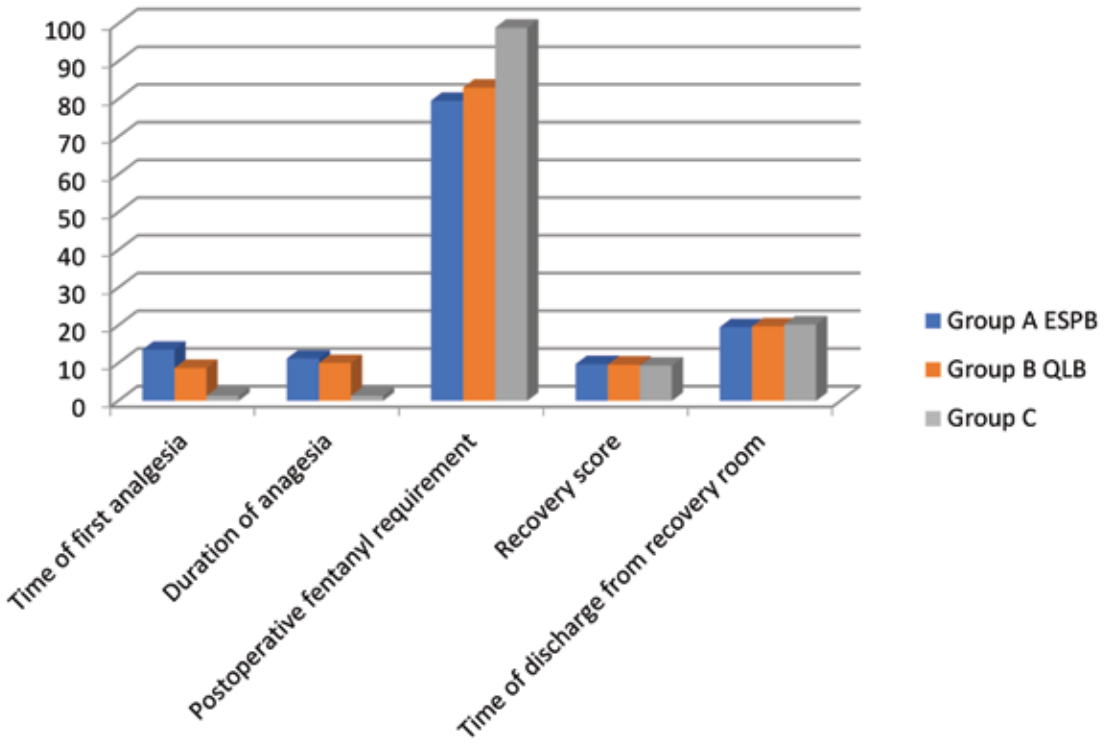

Fig. 2. *Hours of time of first analgesia, duration of analgesia, total postoperative fentanyl requirement, recovery score, and time of discharge from recovery room in the studied groups.*

20, and 24. The intragroup comparisons revealed a significant difference in Group A at postoperative hours 4 and 16, 16 hours in Group B and at 6 hours in Group C (*P* value 0.0001) as seen in Figs. 3 and 4.

Discussion

Laparoscopic cholecystectomy causes less pain compared with the traditional open technique as it is less invasive (6). Postoperative pain from laparoscopic cholecystectomy has 2 components: visceral, due to resection of the gallbladder and stretching of the peritoneum due to insufflation and a parietal component due to trocar site incision (3). The combination of regional analgesia and anesthetic blocks with analgesic drugs as a part of multimodal analgesia is recommended to decrease the risk of chronic pain development (7). Truncal blocks are commonly used for laparoscopic-guided cholecystectomy and many abdominal surgeries. The most popular block is the transversus abdominis plane (TAP) block, whereas QL blocks and ESP blocks have begun to also be used (8).

The ESP block provides thoracic analgesia when applied at the T5 level. If a catheter is inserted at this level, it can provide analgesia as effectively as the thoracic epidural technique after thoracic surgery (9). In a fresh cadaver model, an ESP block when can provide analgesia performed at the T7-T9 level as the injected fluid at T7 cranial spread up to the transverse processes of C7-T2 and caudal spread to the transverse processes of L2-3 (9).

Ultrasound-guided QL nerve block is a type of fascial plane block in which local anesthetic is injected into the QL muscle to anesthetize the thoracolumbar nerves. The injection point is in the fascial plane between the QL posteriorly and the psoas muscles anteriorly (10). In an anterior QL block, the local anesthetic spreads to anesthetize the lumbar nerve roots and branches as well as the thoracic paravertebral region (11).

In cadaveric research including 6 cadavers, Elsharkawy et al (12) compared 2 posterior QL block techniques with a low thoracic ESP block. At T10-T11, they were all given left-sided ESP blocks. At the same

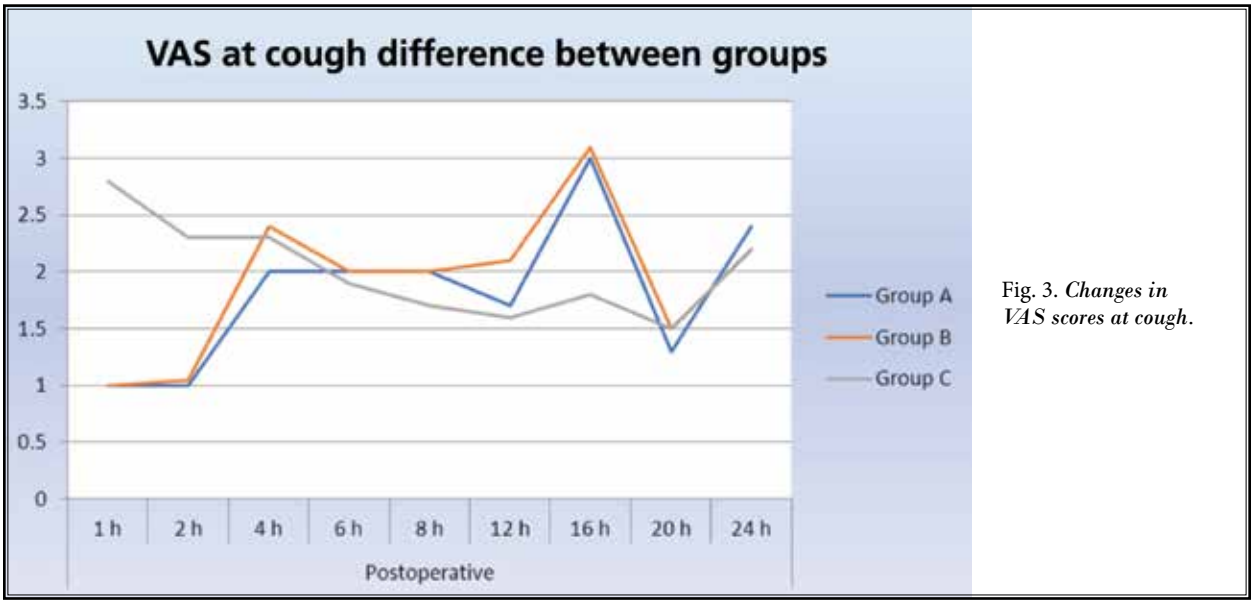

Fig. 3. *Changes in VAS scores at cough.*

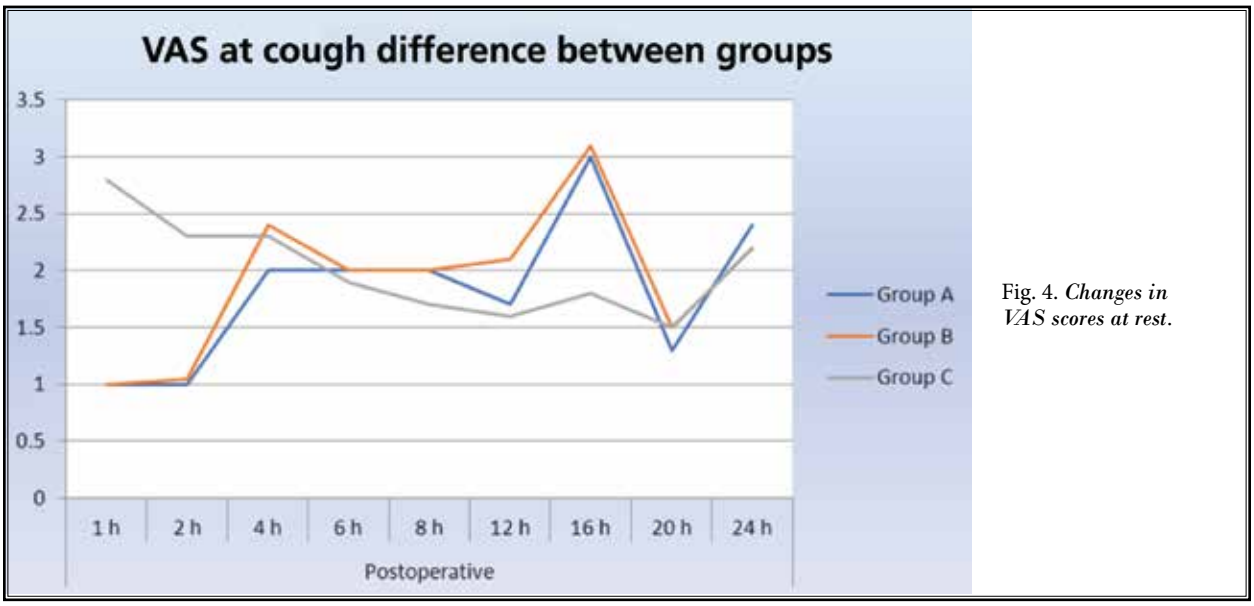

Fig. 4. *Changes in VAS scores at rest.*

L2 level, 3 of them received a right-sided posteromedial block while the others received a right-sided posterolateral QL block. All injections were made by combining 20 mL 0.5 percent methylcellulose with India ink and 10 mL iohexol to achieve a 240 mg/mL concentration. Computed tomography scans and cadaveric dissection were used to document injectate distribution 24 hours after injection. This research found that a posteromedial QL block induces more cranial spread beyond the lumbocostal ligament than a posterolateral QL block performed at the same L2 level, possibly because of the ligament's mobility limitation and that this spread is equivalent to a low thoracic ESP block (12). Also, Adhikary et al (14) found in a cadaveric investigation that the ESP block resulted in increased spread to intercostal gaps spanning 5 to 9 levels, as well as a larger amount of craniocaudal spread along the paraspinal muscles.

Our study suggests that both ultrasound-guided ESP blocks and QL blocks are effective techniques for reducing postoperative pain after laparoscopic cholecystectomy as reflected by decreased VAS score, delayed analgesic request, and a lower analgesic

requirement in both groups receiving a block than in the control group. Patients receiving an ESP block had a slightly longer duration of analgesia than the patients receiving a QL block. Also, postoperative ESP block application was easier than a QL block because we applied bilateral ESP blocks with the patient prone while the QL blocks required changing the position of the patients.

This is in line with Aygun et al (6). They conducted a similar study comparing ultrasound-guided ESP block and QL block for postoperative analgesia in patients undergoing laparoscopic cholecystectomy. They combined 30 mL bupivacaine 0.5% with 10 mL lidocaine 2% and 20 mL normal saline and administered 30 mL to each side. However, in their study, the 30 mL injectate was placed in the interfascial plane between the QL and the latissimus dorsi muscle using the in-plane approach in the QL group. Morphine consumption was observed to be equivalent during postoperative hours one, 6, 12, 18, and 24 ($P > 0.05$). In the first hour, the ESP block group had lower Numeric Rating Scale (NRS-11) scores for resting and moving/coughing ($P > 0.001$). However, in the same previously investigated periods, these scores were identical ($P > 0.01$). The effect of ultrasound-guided bilateral QL block-II was similar to an ESP block in patients undergoing laparoscopic cholecystectomy regarding postoperative pain and opioid consumption, but they differ from our study in the technique of QL block we used. We used an anterior approach (QLIII) while they used (QLII); we injected 20 mL of bupivacaine 0.25% on each side while they injected 30 mL from their mixture (6).

Abd Ellatif and Abdelnaby (15) evaluated 75 patients for open nephrectomy who were classified into 3 equal groups (25 each) who were operated under general anesthesia: a control group (C), and 2 studied groups (QL block and ESP block) using 0.3–0.4 mL/kg of bupivacaine 0.25%. In comparison with the QL block and ESP block groups, morphine consumption and time to first analgesic request were considerably greater and shorter, respectively, in the control group, with no significant difference between the treatment groups. At all time points, the VAS score in the control group was significantly higher than in the treatment groups. An ESP block takes less time to complete than a QL block (15).

In another study, Ibrahim (5) divided 63 patients undergoing laparoscopic cholecystectomy into 3 groups: Group I (control) received trocar site infiltration, Group II (ESP block) received an ultrasound-guided bilateral erector spinae block, and Group III received an oblique subcostal transversus abdominis plane block (OSTAP block). The blocks were all bupivacaine 0.25%. He discovered that Group I required more fentanyl intraoperatively than Groups II and III, and that there was a statistically significant difference in mean 24-hour morphine consumption across the 3 groups, but no difference between Groups II and III. At postsurgery hours 6 and 12, Group I had substantially higher VAS scores at both rest and movement than Groups II and III (5)

Tulgar et al (1) evaluated 60 patients who were divided into 3 groups, each with 20 patients, who were scheduled to have an elective cholecystectomy under ultrasound guidance. Patients in the ESPB group got bilateral ESP blocks, whereas those in the oblique subcostal transversus abdominis plane (OSTAP) group received OSTAP blocks. Patients in group C, the control group, received no block. All patients received 1 g acetaminophen intravenously and tenoxicam 20 mg perioperatively. Following surgery, basal infusion-free tramadol patient-controlled analgesia (PCA) (3 mg/mL, 10 mg bolus, 20 minute lockout time) was programmed with one g intravenous (IV) acetaminophen at 8-hour intervals, but it was skipped if the patient refused or if his Numeric Rating Scale (NRS-11) score was less than 2. If the NRS-11 was more than 3/10, 25 µg fentanyl was administered. Rescue analgesia in the form of 75 mg diclofenac was given if the NRS was still > 3 (1). They found that average NRS-11 scores at rest/cough in the first postoperative 24 hours were comparable between the groups receiving blocks, but when the control group was compared to either of the studied groups separately, there was a statistically significant difference at 20 minutes, 40 minutes, one hour, and 3 hours. There was no statistical difference between the ESP and OSTAP groups. Fentanyl was required by 11, 5, and 6 patients in Group C, ESP block, and OSTAP, respectively. There was a statistical difference between Group C and Group ESP block and Group C and OSTAP in terms of 24-hour acetaminophen need, but no difference across the block groups. The 2-block groups had equivalent tramadol consumption for the first 12 hours, whereas the control group had much higher consumption (1).

Korgün et al (8) reported that posterior QL block is an effective analgesic technique after laparoscopic cholecystectomy in their study, which included 60 patients divided into 2 groups: Group B received IV PCA plus posterior QL block with 0.3 mL/kg bupivacaine 0.25%, and Group S received posterior QL block with 0.3 mL/kg normal saline in addition to IV PCA. At the 6, 12, and 24

hours, Group B had lower statistically meaningful VAS scores and consumed less tramadol (8).

Similar findings were reported in a study carried out by Yousef (16) on 2 equal groups of patients undergoing total abdominal hysterectomy by using general anesthesia. The TAP group received bilateral TAP blocks and the QL group received bilateral QL blocks under sonographic guidance. They found that fentanyl and morphine consumption was significantly lower and the duration of postoperative analgesia was longer in the QL group while the VAS score and the number of patients who asked for rescue analgesia was significantly higher in the TAP group (16). In contrast, Baytar et al (14) in their study, which included 120 patients in 2 groups, each containing 60 patients scheduled for elective cholecystectomy by laparoscopy. Both groups were comparable as regarded to postoperative VAS/dynamic VAS scores and tramadol consumption (14).

Limitations

Limitations of our study include the small number of patients, a short period of follow-up, and only patients with an ASA physical status of I/II were included.

Conclusion

In conclusion, both ESP blocks and QL blocks are taking their places in the literature not only as effective methods for pain management but also for postoperative pain control, especially in laparoscopic cholecystectomy when added to multimodal analgesia to improve the quality of analgesia. ESP and QL blocks are safe, effective, and easy to perform. Additional research is needed to confirm their effects, and cadaveric studies are needed to explain the distribution of local anesthetics after these blocks.

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