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Özgün Araştırma / *Original Article*

Efficacy of Ultrasound-Guided Erector Spinae Plane Block for Postoperative Analgesia in Laparoscopic Cholecystectomy: A Retrospective Cohort Study

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Laparoskopik Kolesistektomide Postoperatif Ağrı için Ultrasonografi Rehberliğinde Erektor Spina Plan Bloğun Etkinliği. Retrospektif Kohort Çalışma

ABSTRACT

Objective: *Laparoscopic cholecystectomy (LC) causes moderate to severe pain. Although it is a minimal invazive surgery, evaluation of the efficacy and safety of ultrasound guided-bilateral erector spinae plane block (ESPB) in the the present study*
Method: *A total of 234 patients who underwent LCs between April 2017 and November 2018 were retrospectively analyzed. Two hundred patients were divided into two groups: The Control Group (Group C, n=100) who received only intravenous (IV) patient-controlled analgesia (PCA) and the ESPB Group (Group E, n=100) who received bilateral ESPB (bupivacaine 0.25, 50 mL) and IV PCA. Also, the block-related complications were recorded.*
Results: *Numeric rating scores in Grup E were lower in post-anesthesia care unit (PACU) at 1st, 2nd, 4th, 6th hours (p<0.0001) and 8th hour (p<0.05). The fentanyl consumption during postoperative period was lower in Group E (p<0.0001). PACU and hospital stay were shorter in Group E (p<0.0001). Need for rescue analgesic was lower in Group E (p<0.0001). Intraoperative fentanyl requirement was lower in Group E (p<0.0001). Unassisted walking time was shorter in Group E (p<0.0001). The incidence of nausea and vomiting was lower in Group E (p<0.05). No block-related complications were encountered.*
Conclusion: *Bilateral ultrasound-guided ESPB provides better analgesia and shortens unassisted walking time and hospital stay after laparoscopic cholecystectomy.*

Keywords: *Analgesia, erector spinae plane block, laparoscopic cholecystectomy, postoperative pain, walking time*

ÖZ

Amaç: *Laparoskopik kolesistektomi (LK) orta dereceden şiddetli dereceye kadar ağrıya neden olur. Her ne kadar minimal invaziv bir cerrahi olsa da mevcut çalışmada ultrasonografi altında bilateral erektor spina plan bloğunun (ESPB) etkinliğinin ve güvenilirliğinin değerlendirmesi planlandı.*
Yöntem: *Nisan 2017 ile Kasım 2018 tarihleri arasında LK uygulanan 234 hasta retrospektif olarak incelendi. İki yüz hasta 2 gruba ayrıldı: Yalnızca intravenöz (İV) hasta kontrollü analjezi (HKA) alan Kontrol Grubu (Grup C, n=100) ve iki taraflı ESPB alan ESPB Grubu (Grup E, n=100) (bupivakain 0.25, 50 mL) ve İV HKA. Ayrıca blokla ilgili komplikasyonlar da kaydedildi.*
Bulgular: *Grup E'deki sayısal derecelendirme skorları anestezi sonrası bakım ünitesinde (ASBÜ), 1., 2., 4., 6. saatlerde (p<0.0001) ve 8. saatte (p<0.05) düşüktü. Postoperatif dönemde fentanil tüketimi Grup E'de daha düşüktü (p<0.0001). PACU ve hastanede kalış süreleri Grup E'de daha kısaydı (p<0.0001). Kurtarma analjezik gereksinimi Grup E'de daha düşüktü (p<0.0001). İntraoperatif fentanil gereksinimi Grup E'de daha düşüktü (p<0.0001). Yardımsız yürüme süresi Grup E'de daha kısaydı (p<0.0001). Bulantı ve kusma insidansı Grup E'de daha düşüktü (p<0.05). Blokla ilişkili herhangi bir komplikasyonla karşılaşılmadı.*
Sonuç: *Bilateral ultrason eşliğinde ESPB, daha iyi analjezi sağlar ve laparoskopik kolesistektomi sonrası yardımsız yürüme süresini ve hastanede kalış süresini kısaltmaktadır.*

Anahtar kelimeler: *Analjezi, erektor spina plan blok, laparoskopik kolesistektomi, postoperatif ağrı, yürüme zamanı*

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INTRODUCTION

Laparoscopic surgery is an advantageous surgical method because it is associated with milder postoperative pain, smaller incision, lower rates of postoperative ileus, lesser blood loss, faster recovery, and a shorter hospital stay. Although less pain is one of the major advantages of a laparoscopy, pain does not disappear completely postoperatively, and it is still an important issue [1,2].

Pain after a laparoscopic cholecystectomy (LC) is related to abdominal distention, port-site incision, and phrenic nerve irritation due to CO_2 insufflation; therefore, pain felt after removal of the gallbladder has both visceral and somatic origins [3]. Acute postoperative pain is correlated with increased myocardial ischemia, thromboembolic and pulmonary complications, changes in the immune system due to opioid use, an increased hospital stay, an inadequate quality of life, and chronic pain at a rate of 3-56 percent [4,5]. Therefore, pain should be treated without causing peripheral hypersensitivity and central nervous system hyperexcitability [1].

Non-steroidal anti-inflammatory agents, intravenous opioids, local anesthetic (LA) infiltration of incision sites, preemptive analgesia methods, and regional anesthesia techniques are used in multimodal analgesia [1,6-9]. The regional anesthesia techniques include the transverse abdominis plane (TAP) block, oblique subcostal transverse abdominis plane (OSTAP or STAP) block, and paravertebral block [6-9]. Because these techniques other than paravertebral block only affect somatic pain, they might be inadequate in some cases [10].

The erector spinae plane block (ESPB) which is a peri-paravertebral regional anesthesia technique and first described for the treatment of thoracic neuropathic pain has been applied to prevent postoperative pain in various surgical procedures, including LC [6,11-14]. Generally, previous studies have focused on postoperative pain, but any clinical trials have not been performed on this issue, with the exception of case reports on discharge and mobilization.

Our hypothesis was that ultrasound-guided preincision bilateral ESPB application would provide superior postoperative analgesia after LC compared to iv patient-controlled analgesia (PCA). For this purpose, it was planned to investigate the postoperative opioid consumption, numeric rating scale (NRS) pain scores, intraoperative opioid requirement, the time to the requirement of the first rescue analgesic, unassisted walking time, stay in post-anesthesia care unit (PACU) and hospital discharge times, opioid-related side effects, and block-related complications.

MATERIALS and METHODS

The study protocol was approved by the local ethics committee (KA/18/427). In addition, this study was conducted in accordance with the principles of the Declaration of Helsinki. As soon as the local ethics committee gave its approval, the patient files were reviewed. Prospectively collected data were retrospectively analysed. A total of 234 patients who underwent LCs between April 2017 and November 2018 were analyzed. Those patients who were deemed eligible to participate in the study were called to the hospital to obtain their written informed consent. A written informed consent form was obtained from each patient who was included the study. These patients between 18 and 65 years old who were in American Society of Anesthesiologists (ASA) classes I-III and underwent LCs. The exclusion criteria were as follows: a previous history of opioid use preoperatively, repeat surgery, a conversion to open surgery, an allergy to local anesthetics, urgent surgery, the presence of any systemic infection, pregnancy, and regional anesthesia other than an ESPB. A total of 34 patients were excluded from the study including patients who used opioids (n=9), those scheduled for emergency cholecystectomy (n=10), open cholecystectomy (n=13), cases with systemic infection (n=1), and pregnant women (n=1). A total of two hundred patients were divided into two groups as Group C (Control; n=100) and Group E (ESPB; n=100) (Figure 1).

Premedication, general anesthesia induction, and maintenance were the same for all patients. Standard monitoring procedures included pulse oximetry, electrocardiography, and noninvasive arterial pressure measurement prior to anesthetic induction. The premedication was made by intravenous (iv) midazo-

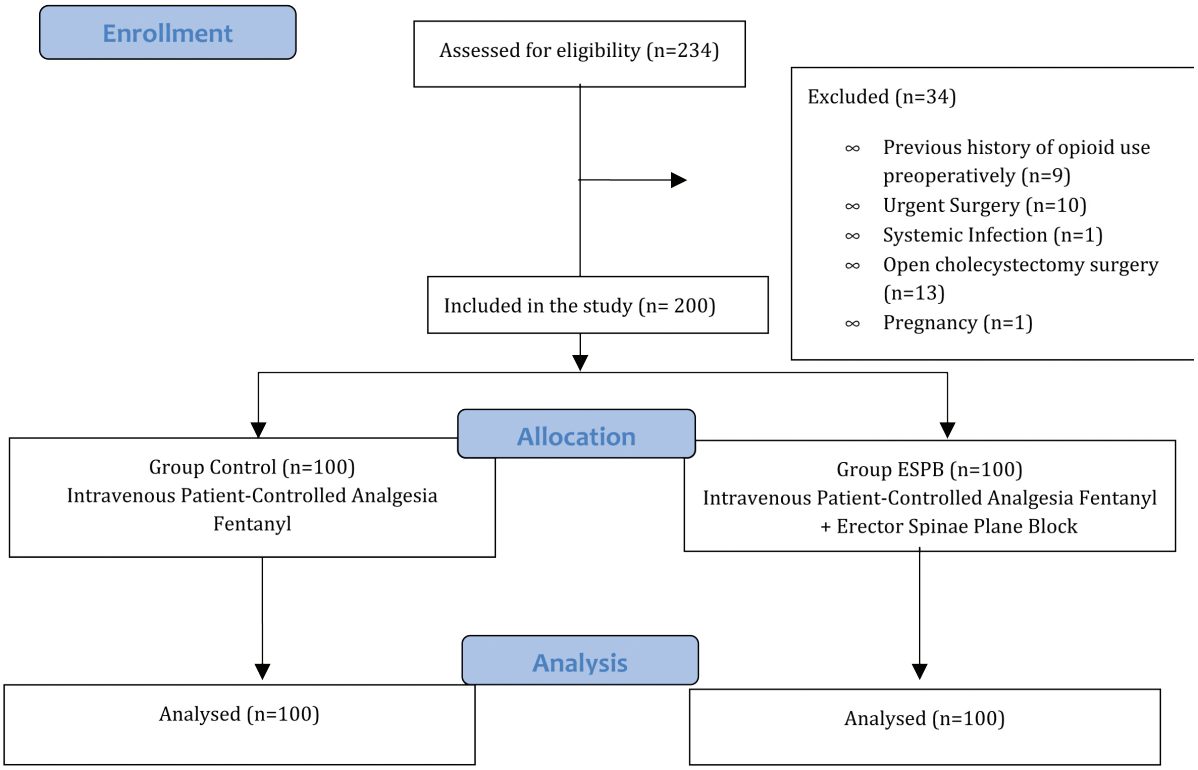


Figure 1. Flow chart of the study

lam 1-2 mg and antibiotic prophylaxis. Anesthesia induction was achieved with intravenous (IV) 2 mg kg^{-1} propofol, 0.5-1 µg kg^{-1} fentanyl and muscle relaxation with 0.6 mg kg^{-1} rocuronium. Following intubation, 0.1 mg kg^{-1} rocuronium was administered for muscle relaxation when necessary. Anesthesia was maintained with sevoflurane in a 40-60% O_2-air mixture with a 0.6-0.8 age-corrected minimal alveolar concentration (MAC). As intraoperative analgesic, remifentanil 0.125 µg kg^{-1} min^{-1}, was used (tidal volume = 6-8 mL kg^{-1}, frequency = 12 $minute^{-1}$). If the patient's heart rate and mean arterial pressure were raised above 20% of the baseline according to clinic's protocol, 1 µg kg^{-1} IV fentanyl was administered and a 50% increase in sevoflurane concentration was maintained. The operation was performed with prior standard surgical procedures by a single surgical team without any complications evaluated within the scope of the study. The patients were taken to the PACU after the extubation. PACU stay was determined as time between the transfer of the patients to PACU and discharge when the patient's modified Aldrete score riise up to 10 points.

Postoperative Pain Management

Patients in Group C were applied iv analgesia plan by PCA device postoperatively without block. Patients in Group E were given both IV analgesia and ESPB preoperatively. Patients in both groups were given 1 g paracetamol and 20 mg tenoxicam twenty minutes before the end of the operation.

Postoperative analgesia was assessed using NRS pain score. The 11 point numeric scale ranges from "0" representing lack of pain ("no pain") to "10" representing the extreme pain ("pain as severe as you can imagine" or "worst pain imaginable"). Meperidine 25 mg IV was administered. If NRS pain score was ≥ 3/10 in PACU. The PCA device was programmed with a concentration of 10 µg mL^{-1} fentanyl given initially at a bolus dose of 25 µg, then 10 minutes lockout interval without any basal infusions. The PCA device was prepared in the PACU and set when the patients were discharged from PACU. All of the patients were administered 15 mg kg^{-1} of IV paracetamol regularly every six hours. If NRS pain score was ≥ 3/10, then rescue analgesic (IV 25 mg meperidine) was administered by a nurse in the ward.

ESPB Technique

Before induction of anesthesia, the lower end of the scapula and the spinous process of the T7 vertebra were determined while the patient was in a prone position. These areas were then cleaned and sterilized with povidone iodine. A high frequency linear ultrasound probe covered with a sterile sheath was placed sagittally on the spinous process of the T7 vertebra, and then, it was slid 3-cm laterally in the parasagittal region. After the transverse process of the vertebra was visualized, a 22-gauge 10-cm needle was advanced through the interfascial plane between the erector spinae and the underlying transverse process. Afterwards, the separation caused by hydrodissection was confirmed by administering 0.5-1 mL of fluid. Next, 25 mL of 0.25% bupivacaine was injected into the space. The craniocaudal spreading of the local anesthetic was observed (Figure 2). Then, the same procedure was repeated on the other side for pain management after LC.

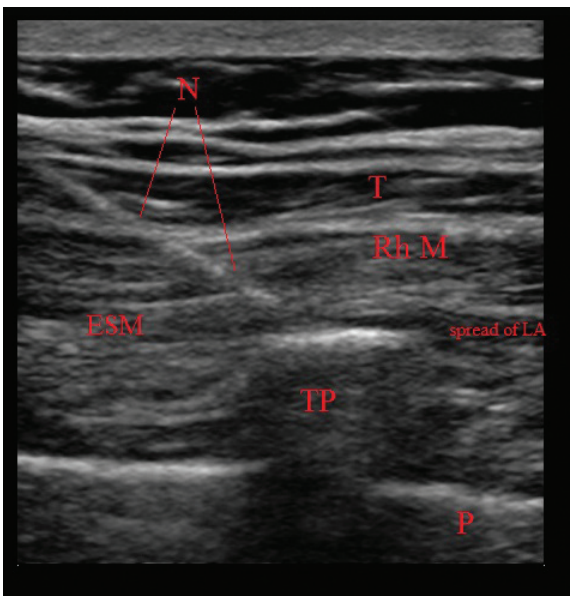


Figure 2. Scanning ultrasonogram demonstrating Trapezius (T), Rhomboid Major (Rh M) and Erector Spinae Muscle (ESM), Pleura (P), T7 transverse process (TP), Needle (N) and spread of local anesthetic (LA). Erector spinae plane block performs at level of T7 transverse process. The needle inserts with in-plane technique and the tip of needle contacts the TP. Then local anesthetic (LA) injects into the fascial plane between ESM and TP

Outcome measures

Primary measures

NRS score at PACU, at 1st, 2nd, 4th, 6th, 8th, 12th, and 24th postoperative hours and the amount of fentanyl consumption at the 0-4th, 4-8th, and 8-24th postoperative hours were examined.

Secondary measures

Side effects, including nausea and vomiting, pruritus, respiratory depression, bradycardia and hypotension, intraoperative fentanyl requirement, the need for rescue analgesic in PACU, the need for rescue analgesic in ward, the time to the first analgesic in the ward, unassisted walking time, PACU and hospital stay were evaluated. PONV was assessed using the Nausea-Vomiting Scale (NVS): as follows (1) no nausea, (2) mild nausea, (3) severe nausea, (4) vomiting. If NVS score of >3, ondansetron was administered.

The patients were discharged from the hospital based on the protocols followed by the surgical team, which included a pain score of <3 without meperidine as well as postoperative nausea and vomiting (PONV) and sedation scores of 0.

Statistical Analyses

The descriptive statistics, such as the mean, standard deviation (SD), frequency, and percentage were given for the continuous and nominal variables, where appropriate. T-tests, Mann Whitney U and Pearson chi-squared or Fisher's exact tests were used when comparing variables between two groups. Mixed effects models were used to analyze the time and group effects on the main outcomes of the study. The analyses were performed using SAS University Edition 9.4 (SAS Institute Inc., Carey, NC, USA). A p value of < 0.05 was considered to be statistically significant.

RESULTS

The patients eligible for this study were analyzed, and the results have been presented in a Consolidated Standards of Reporting Trials flow diagram (Figure 1). The groups were comparable with respect to age, BMI, sex, ASA status, operative time, and anesthesia time (Table I).

Total fentanyl consumption during the 24-hour period was higher in Group C than in Group E (161±69.6 µg vs. 76±56.8 µg, $p<0.0001$) (Table II).

NRS pain scores at PACU, at postoperative st, 2nd, 4th, and 6th hours were higher in Group C than in Group E (p<0.0001 each). The 8th hour NRS score was also higher in Group C than in Group E (0.6±0.7 vs. 0.3±0.4, p<0.05) (Table III, Figure 3). Group, time and group x time interaction for NRS pain scores were statistically significant (p<0.0001 each).

The intraoperative fentanyl requirement was higher in Group C than in Group E (68% vs. 13%, p<0.0001).

Table I. Demographic characteristic of study patients

	Group C (n=100)	Group E (n=100)	p
Age, yr	45.3±10.9	44.8±10.8	0.731[a]
Weight, kg	75.5±8.9	75.1±9.3	0.761[a]
BMI, kg m^{-2}	25.2±2.9	27.1±2.9	0.891[a]
ASA status (I/II/III)	60/27/13	58/27/15	0.915[b]
Sex (F/M)	61/39	48/52	0.007[b]
Duration of surgery, min	42.1±3.9	42.4±4.3	0.527[a]
Duration of anaesthesia, min	52.4±4.5	53±4.9	0.405[a]

Values are presented as number or mean±standart deviation. ASA=American Society of Anesthesiologists.
[a] Independent sample t test.
[b] Chi-square test.

Table II. Comparison of the fentanyl consumption at postoperative time points

	Group C (n=100)	Group E (n=100)	p
0-4th h, µg	91.3±33.4	45.3±30.3	≤0.0001[a*]
4-8th h, µg	44.8±29.6	24.5±22.6	≤0.0001[a*]
8-24th h, µg	27±26.3	7.3±11.4	≤0.0001[a*]
Total fentanyl consumption, µg	161±69.6	76±56.8	≤0.0001[b*]

Values are presented as mean ± standard deviation.
[a] Mixed effects model.
[b] Independent sample t test.
** P<0.05 is statistically significant.*

Table III. Comparison of NRS pain scores at postoperative time points between groups

	Group C (n=100)	Group E (n=100)	P†
PACU	6.1±1.6	1.7±1.7	<0.0001*
1th h	4.8±1.8	2.5±1	<0.0001*
2th h	3.8±1.3	2.1±1.1	<0.0001*
4th h	2.3±1.3	1.4±1.1	<0.0001*
6th h	1.2±1.2	0.4±0.5	<0.0001*
8th h	0.6±0.7	0.3±0.4	0.039*
12th h	0.3±0.4	0.1±0.3	0.206
24th h	0.1±0.3	0±0	0.594

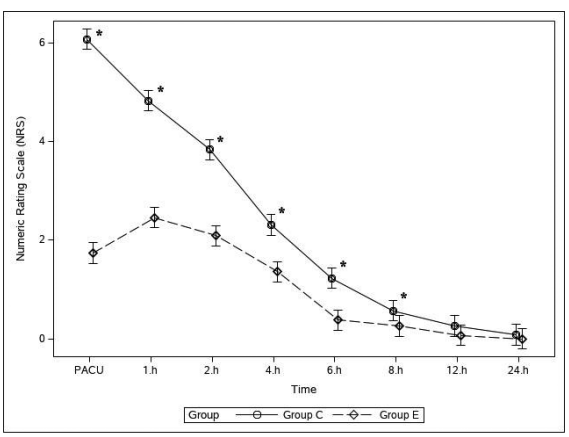
Values are presented as mean±standard deviation. PACU=post anaesthesia care unit.
† Mixed effects model.
** P<0.05 is statistically significant*

The need for rescue analgesic in the PACU was higher in Group C than in Group E (64% vs. 12%, p<0.0001). The need for rescue analgesic in the ward was higher in Group C than in Group E (64% vs. 14%, p<0.0001). The time to the requirement of first analgesic in the ward was shorter in Group C than in Group E (72.5±32.8 min vs. 154.6±60.5 min, p<0.0001). The unassisted walking time was prolonged in Group C than in Group E (169.9±11.8 min vs. 131.4±14.8 min, p<0.0001). PACU and hospital stay were longer in Group C than in Group E (17.3±3.1 min vs. 10.4±1.9 min and 27.6±3.7 hours vs. 24.4±1.1 hours, p<0.0001) (Table IV).

Table IV. Comparison of the intraoperative fentanyl requirement, the need for rescue analgesic in PACU, the need for rescue analgesic in ward, the first analgesic need time in ward, unassisted walking time, PACU and hospital stay between groups

	Group C (n=100)	Group E (n=100)	P†
Intraoperative fentanyl requirement (%)	68	13	<0.0001[a*]
The need for rescue analgesic in PACU (%)	64	12	<0.0001[a*]
The need for rescue analgesic in ward (%)	64	14	<0.0001[a*]
The first analgesic need time in ward (min)	72.5±32.8	154.6±60.5	<0.0001[b*]
Unassisted walking time (min)	169.9±11.8	131.4±14.8	<0.0001[b*]
PACU stay (min)	17.3±3.1	10.4±1.9	<0.0001[b*]
Hospital stay (hour)	27.6±3.7	24.4±1.1	<0.0001[b*]

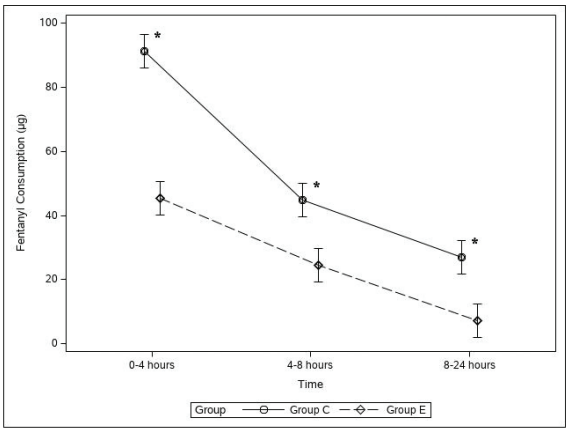
Values are presented as frequency (percentage) or mean±standart deviation. PACU=Postanesthesipa care unit
[a] Chi-square test.
[b] Independent sample t test.
** P<0.05 is statistically significant.*



**P<0.05 between groups at the PACU, 1st, 2nd, 4th, 6th and 8th*

Figure 3. NRS pain scores between groups in the postoperative time points

The fentanyl consumption at time periods of 0-4th, 4-8th, 8-24th h were higher in Group C than in Group E (91.3±33.4 µg vs. 45.3±30.3 µg, 44.8±29.6 µg vs. 24.5±22.6 µg, and 27±26.3 µg vs. 7.3±11.4 µg, respectively, p<0.0001) (Table II, Figure 4). Group, time, group x time interaction for fentanyl consumption at postoperative time points were statistically significant (p<0.0001 each).



**P<0.05 between groups at 0-4 hours, 4-8 hours and 8-24 hours*

Figure 4. Fentanyl consumption between groups in the postoperative time points

The incidence of nausea and vomiting was higher in Group C than in Group E (n=8 vs. n=0, p=0.007). The other side effects, were not statistically significantly different between both groups.

DISCUSSION

Our study demonstrated that postoperative fentanyl consumption during 24 hours and NRS pain scores at PACU, at postoperative 1st, 2nd, 4th, 6th and 8th hours were lower in the ESPB group. Moreover, intraoperative fentanyl requirement, and need for rescue analgesia was lower in the ESPB group than control group. In addition, the time to unassisted walking was decreased and PACU stay and time to hospital discharge were shorter in the ESPB group.

After LC, approximately 80% of the patients reported severe postoperative pain (2) peaking during the first 8 hours [1]. Postoperative pain after an LC occurs for two reasons. The first is visceral pain due to the removal of the gallbladder and peritoneal CO_2 exposure and stretching; the second is somatic pain due to skin incision [15]. If acute postoperative pain is not treated adequately, it may trigger chronic pain. Besides, it may lead to increased risk of myocardial ischemia, thromboembolism, pulmonary complications, and immune system changes [1]. Therefore, the struggle against pain should begin before peripheral hypersensitivity and central nervous system hyperexcitability occur [16]. Therefore, the analgesia protocol should be effective on both somatic and visceral sources of pain.

Various block methods have been used to relieve pain after LC. The conventional lateral transversus abdominis plane (TAP) block for postoperative pain in LC was both effective and ineffective in recent studies [17,18]. Considering the surgical area, oblique subcostal block (OSTAP) was chosen as an analgesic method in LC [7,19]. However, since both TAP and OSTAP blocks have an impact on cutaneous sensory nerve fibers, they have effects on somatic pain and sometimes on all parietal components from the skin to the parietal peritoneum [20]. In recent studies, lack of any significant analgesic effectiveness of TAP and OSTAP block in LC has not been indicated [18,21]. Ra YS et al., [17] showed that TAP block was effective for postoperative analgesia in LC, because NRS pain scores were lower in the TAP block group. NRS pain scores were also lower in our study. Because ESPB which is effective on parietal and visceral pain and has a wide distribution area was more effective than TAP block which has an effect on somatic pain but has less effective on lateral abdominal walls. In another study it was shown that ESPB was more effective than OSTAP block. Postoperative tramadol consumption was lower in the ESPB group, but there was no difference between the OSTAP and ESPB as for NRS pain scores of patients who had undergone LC [22].

Forero et al. [11] demonstrated that the local anesthesia in an ESPB spread to both the ventral and dorsal rami of the spinal nerves, while Ueshima and Hiroshi supported its paravertebral spread [23]. In a recent magnetic resonance imaging study, the researchers demonstrated the spread of local anesthesia to the paravertebral space, lumbar plexus, interforaminal space, and epidural space in lumbar ESPB performed at a high volume at the level of the L4 vertebra [24]. In one case, it was indicated that unilateral local anesthesia performed using 30 mL of local anesthetic agebt caused sensorial blockage of the contralateral

dermatomes [25]. Additionally, unilateral ESPB was reported to be as effective as bilateral ESPB on postoperative pain by causing sensorial blockade in the contralateral dermatome, due to the facilitative effect of the pneumoperitoneum and the gravitational effect of the positional change in laparoscopic cholecystectomy [26].

Tulgar et al. [20] applied pre-incisional bilateral ESPB with 20 mL of 0.375% bupivacaine infused at the T9 level for patient who had undergone LC. They indicated that the NRS pain scores and tramadol consumption decreased during the first 3 hours postoperatively, rescue analgesia had been required for 26.7% (4/15) of cases in PACU and 20% (3/15) of patients in the ward. In another study by Tulgar et al. [15], post-incisional ESPB with total 40 mL LA mixture containing 20 mL 0.25%, bupivacaine 10 mL 0.5% lidocaine and 10 mL normal saline was applied for the same operation. ESPB. They showed that tramadol consumption during the second 12 hours did not differ, while tramadol consumption during the first 12 hours and NRS pain scores at 20 min, 40 min, 1 hour, and 3 hours was lower. In our study, we performed bilateral ESPB with total 50 ml of 0.25% bupivacaine at the T7 level and pointed out that the NRS pain scores during the first 8 hours, which is the most painful period for an LC, both intraoperative fentanyl requirement and fentanyl consumption during the postoperative 24 hours were lower than control group. Rescue analgesic requirement was at a rate of 12% in the PACU and 14% in the ward. Besides, the time to the need for the first analgesia was prolonged in the ESPB group than the control group. We determined that our results were better than both studies of Tulgar et al. [15,20] due to the usage of high volume (50 mL total) local anesthetic. Also, we believed that pneumoperitoneum facilitated the spread of LA.

Inadequate postoperative pain control increases opioid use and negatively affects early mobilization, the hospital discharge time and the occurrence of opioid related side effects such as nausea, vomiting, pruritus, and sedation, [1]. PONV has a strong correlation not only with opioid use but also with pain. PONV can aggravate pain [27]. Hanning et al. [14] applied pre-incisional bilateral ESPB from T7 level in three patients who had undergone LC and planned postoperative pain management with oral opioid. They observed that the NRS pain score was ≤4 on the first day, ≤3 on the second day, 0 on the seventh day and no patient had PONV. We also applied pre-incisional bilateral ESPB from same level, but postoperative pain management was performed with iv PCA. We observed that NRS pain score was <3 in all periods on the first day and PONV was not detected in any patients. Therefore, although LC is an ambulatory surgery, we believe that these patients should be followed up for 24 h with ESPB plus IV PCA.

In our study, we observed that pre-incisional ESPB provided favorable contributions. Both the duration of the stay and the need for rescue analgesics were lower in the PACU due to the lower intraoperative opioid requirement and fentanyl consumption. Besides, lesser requirement for rescue analgesics, and longer time to need for the first analgesic thanks to the lower NRS pain scores at the postoperative period are its advantages. In addition, patients started to walk without help within a shorter time, hospital stay was decreased and opioid-related side effects nausea, vomiting, and were not encountered in the ESPB group. In the literature, the effects of an ESPB on the postoperative pain and opioid consumption after LC were described in clinical studies. We believe that our study is the first retrospective study to show the effects of an ESPB on early mobilization and the hospital stay as well as lesser pain and opioid consumption

Pneumothorax and motor weakness were two reported complications of ESPB [28]. Since ultrasound-guided ESPB was performed, it was difficult to encounter pneumothorax. Motor weakness can occur when the local anesthesia is applied at the lower thoracic and lumbar levels, which may involve lumbar plexus. We did not encounter any complications. Systemic toxicity of local anesthetic (LAST) caused by its dissemination and administration high-volume can also be described as complications. Tulgar et al. [29] encountered LAST in two patients with 0.25% bupivacaine plus 0.5% lidocaine, and in one patient with bilateral 0.25% bupivacaine administration. However, they did not encounter LAST with 60 mL of 0.375% bupivacaine. Limit values for volume and concentration of the anesthetic agents to be used for ESPB have not been specified yet [30]. We performed

block with a total of 50 mL of 0.25% bupivacaine. The LAST was not encountered in any of the patients.

There were several limitations of our study. First of all it was a retrospective study. Secondly, sensory dermatome areas were not identified. Therefore, block insufficiency could have been encountered. Thirdly, chronic pain could not be evaluated. We believe that further studies will provide a more comprehensive contribution to treating postoperative pain by examining these topics.

The results of our study showed that a pre-incisional bilateral ultrasound-guided ESPB provides effective analgesia. It enables earlier mobilization and shortens the hospital stay, while decreasing the intraoperative and postoperative opioid consumption.

Acknowledgments
Study design: O.K., H.U.P.
Administration of block: O.K.
Data collection: O.K., H.U.P.
Data analysis: O.K., H.U.P.
Writing up of the first draft of the paper: O.K.

Ethics Committee Approval: Baskent University Medical and Health Sciences Research Board approval was received (KA18/427).
Conflict of Interest: The authors declare that they have no competing interest.
Funding: None.
Informed Consent: A written informed consent form was obtained from each patient who was included the study.

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