Original Article

Posterior Quadratus Lumborum Block Versus Posterior Transversus Abdominis Plane Block for Unilateral Inguinal Hernia Surgery

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ABSTRACT

Background: Ultrasound-guided truncal nerve blocks are increasingly used for postoperative pain relief after abdominal surgery. **Aim:** The aim of this prospective and randomized study was to compare posterior transversus abdominis plane block (pTAPB) with posterior quadratus lumborum block (pQLB) for postoperative analgesic efficacy in patients undergoing unilateral inguinal hernia surgery under general anesthesia (GA). **Patients and Methods:** A total of 90 adult patients were randomized into 3 groups: group pTAPB (n = 30), group pQLB (n = 30), and group Control (n = 30). The patients in groups pQLB and pTAPB received a unilateral block using 20 ml of 0.25% bupivacaine after the induction of GA. Intravenous (IV) tramadol patient control group analgesia (PCA) and paracetamol were used in the postoperative period as a part of the multimodal analgesic regimen in both groups. Postoperative pain was assessed using a visual analog scale (VAS) during postoperative 24 h. Dexketoprofene was used as a rescue analgesic when VAS is >3. The primary outcome measure was mean pain scores. Secondary outcome measures were consumption of rescue analgesics and the amount of tramadol delivered by PCA. P <0.05 was considered statistically significant. **Results:** Mean VAS scores were significantly lower in the group pQLB than group pTAPB and group Control at all-time points (pQLB < pTAPB < Control; P < 0.001). Rescue analgesic was not required in group QLB. Rescue analgesic consumption, the number of bolus demand on PCA, and total PCA dose were highest in group Control and lowest in the pQLB group (Control > pTAPB > pQLB; P < 0.001). **Conclusion:** It is concluded that both pQLB and pTAPB provided effective pain relief after unilateral inguinal hernia surgery. pQLB was superior to pTAPB due to lower pain scores and analgesic consumption.

Keywords: *Inguinal hernia surgery, postoperative analgesia, quadratus lumborum block, transversus abdominis plane block*

Introduction

The truncal nerve blocks have gained popularity as a part of perioperative pain management in abdominal and chest wall surgery for more than 20 years. Since the first description by Rafi in 2001, the transversus abdominis plane block (TAPB) became one of the most commonly performed truncal blocks for postoperative pain relief in a large scale of surgical interventions, especially after the introduction of ultrasound (US) in anesthesia practice.[1] In TAPB, a local anesthetic (LA) is also injected into the plane between the facias of internal oblique muscle and transversus abdominis muscle (TAM) to block thoracolumbar nerves originating from thoracic (T) 6 to lumbar (L) 1 spinal root that supply sensory nerves to the anterolateral abdominal wall.

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Blanco first described the quadratus lumborum block (QLB) in 2007 as a TAP block variant.[2] It is a fascial plane block, which extends from T4 to L1 at the paravertebral space. Injection of LA between the fascial plane of the quadratus lumborum muscle (QLM) and the psoas major muscle (thoracolumbar fascia) provides the block dermatomes between T4–T5 and L2–L3 levels. Each block is classified based on the site of injection and target dermatomes. There are five types of TAP blocks (subcostal, lateral, posterior, oblique subcostal, and dual) and four types of QLB (lateral, posterior, transmuscular, and intramuscular) described.[3] In both blocks, posterior approaches were found safe and effective in alleviating postoperative pain in the lower abdominal surgery with unilateral or bilateral single bolus injections of Las.[4,5]

In literature, there are cadaver studies about the anatomic spread of both blocks. However, studies comparing the two blocks' reflection on the patient's clinical as a part of the multimodal analgesic regimen are rare.[6,7] Enhanced recovery after surgery protocols recommend the use of different analgesic pathways as well as regional analgesia techniques to provide postoperative pain relief and to reduce the consumption of narcotic analgesics.[8]

This prospective and randomized study aimed to compare unilateral posterior TAPB with unilateral posterior QLB to provide postoperative analgesia in patients undergoing inguinal hernia surgery. The primary outcome measure was postoperative pain scores. The secondary outcomes were postoperative rescue analgesic consumption, the use of patient-controlled analgesia (PCA), and complications.

Material and Methods

Study design

This prospective and randomized trial was conducted in the University of Health Sciences' operating theaters, between December 2019 and March 2020 after the Hospital's Ethics Committee approval (date: 11.11.2019, protocol no: 75/08). The trial was registered with Clinical Trials.gov (NCT04143542). Written informed consent was obtained from patients. The study was designed according to the CONSORT criteria [Figure 1].

All procedures performed in studies involving human participants or on human tissue followed the institutional and national research committee's ethical standards and the 1975 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Inclusion criteria

The study included the American Society of Anesthesiologists' physical status one to two patients aged between 18 and 80 years scheduled for elective unilateral open inguinal hernia surgery under general anesthesia (GA).

Exclusion criteria

Exclusion criteria included the patient's refusal, recurrent surgery, pregnancy, history of allergy to study drugs, neurological and cognitive disorders, coagulopathy, chronic pain disorder, and infection at the injection site.

Allocation and randomization

A sealed, opaque envelope containing allocated randomization was opened in the operating room after induction of GA. Patients were allocated in a 1:1:1 ratio to one of three groups: Posterior Quadratus Lumborum Block (Group pQLB, $n = 30$), group posterior transversus abdominis plane block (group pTAPB, $n = 30$), and group Control (Group C, $n = 30$).

Anesthetic procedure

All patients were given midazolam (2–3 mg) for sedation, 50 mg ranitidine for gastric protection, and 8 mg ondansetron to prevent postoperative nausea and vomiting after establishing an intravenous (IV) access at the ward. After arriving in the operating room, patients were monitored with an electrocardiogram, pulse oximetry, and non-invasive blood pressure.

General anesthesia

GA was induced using IV propofol (2 mg kg^{-1}), rocuronium (0.6 mg kg^{-1}), and fentanyl (1 μg kg^{-1}). An endotracheal tube (no: 6.5–8.5) was placed to secure the airway. Anesthesia was maintained with sevoflurane (2–3% MAC) in 50% nitrous oxide/50% oxygen mixture. All patients were given IV paracetamol (10 mg kg^{-1}) and tenoxicam (10 mg) in the intraoperative period for postoperative pain relief.

Block procedure

All blocks were performed in a sterile manner by the same anesthesiologist who was experienced in US-guided regional blocks. All precautions were taken to prevent or treat LA toxicity including careful aspiration to avoid IV administration of LA before the injection, limit the amount of the LA, continuous monitorization of vital parameters, and the availability of the IV lipid emulsion (intralipid 20%) in the operating room.

Posterior quadratus lumborum block

Patients in group pQLB were placed in lateral decubitus position. A preliminary scan with a convex probe 6–13 MHz US transducer was performed (SonoSite MICRO MAXX™, SonoSite™, Bothell, WA, USA). The probe was placed transversely between the iliac crest and the costal margin at the midclavicular line and moved cranially to observe external oblique, internal oblique, and TAMs, which form three muscular layers. The probe was directed posteriorly, where three muscular layers ended, and QLM and thoracolumbar fascia were observed. A 22-G, 100-mm block needle (SonoTAP, Pajunk, Geisingen, Germany) was directed using the in-plane technique to the posterior border of QLM, between QLM and latissimus dorsi muscles. A test dose of 2 ml saline was used to confirm the site and for hydrodissection. Twenty milliliter of 0.25% bupivacaine was administrated after negative aspiration.

Posterior transversus abdominis plane block

Patients in group pTAPB were placed in a lateral decubitus position. The probe was located near or at the midaxillary line between the costal margin and the iliac crest and then moved more posteriorly. The injection site was superficial to the aponeurosis of TAM near QLM. A test dose of 2 ml saline was used to confirm the site and for hydrodissection. Twenty milliliter of 0.25% bupivacaine was administrated after negative aspiration.

The patients in group Control had not received an intervention. After the surgery, GA was discontinued, and patients were extubated after spontaneous respiration was returned.

Follow-up period

All patients were followed for 30 min in the post-anesthesia care unit (PACU) after the surgery and then discharged to the ward. Patients received the following treatments in the multimodal analgesic regimen at the postoperative period: (a) IV paracetamol 1000 mg with 8-h intervals, and (b) IV tramadol patient-controlled analgesia (IV-PCA; 4 mg h^{-1} infusion, bolus dose on demand: 5 mg, lockout time: 30 min, 4-h limit: 60 mg). Postoperative pain was evaluated using a VAS (0–10 cm) in PACU (0 h), then at postoperative 2, 4, 6, 8, 12, and 24 h at the ward by a research assistant who was blinded to the groups. IV dexketoprofen 50 mg was given as a rescue analgesic when VAS >3. The rescue analgesic consumption, the number of bolus demand on PCA, and tramadol consumption via PCA were recorded between the same time intervals (0–4 h, 4–8 h, 8–12 h, and 12–24 h) in groups. Patients with normal vital parameters were discharged from the hospital after 24 h when the VAS score was <3. VAS was also used to assess the patient's satisfaction level which ranged from not satisfied (score 0 cm) to fully satisfied (score 10 cm) with the treatment outcomes at discharge.

The following criteria were recorded and compared between groups: demographic data, mean operative times (min), VAS scores, time first to rescue analgesic (h), rescue analgesic consumption (mg), number of bolus demand via PCA, bolus dose on demand (mg), total PCA consumption (mg), patient's satisfaction score, and complications. Complications were defined as complications related to the block (nerve injury, LA toxicity), to the surgery (bleeding, infection, and thromboembolism), and to the anesthetic management (respiratory depression, nausea and

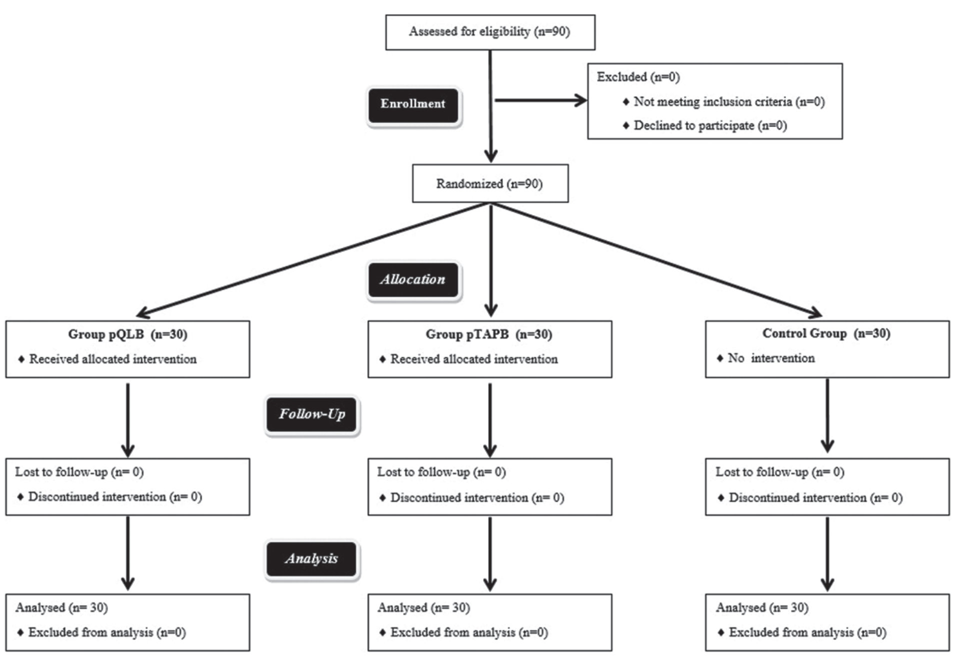

Figure 1: Study flow diagram. pQLB = Posterior quadratus lumborum block, pTABP = posterior transversus abdominis plane block

vomiting, hemodynamic instability, itching, constipation, and dizziness).

Statistical analysis

Statistical analysis was performed using IBM SPSS Statistics version 21 (IBM SPSS Inc., Chicago, IL). The sample size was calculated using power analysis to detect a minimum clinically significant difference of 20% in the VAS scores between study groups. A preliminary study involving 30 patients (10 patients in each group) indicated that minimum 75 cases would be needed to achieve 80% power with an alpha error of 0.05, equivalent to an effect size of 0.8. Estimating that 15% of patients may drop out of the study for various reasons, the sample size was increased to 90 patients (30 in each group). Descriptive statistics were used as mean, standard deviation, the median for continuous data, and frequency and percentage for categorical data. The normal distribution of data was analyzed with the Kolmogorov–Smirnov test. Independent sample *t*-test and Chi-square test were used for comparing demographic data. The difference in variables, including VAS scores, number of PCA bolus on-demand, and total PCA bolus dose between groups, was analyzed using Linear Mix Design ANOVA and *post-hoc* Tukey test. P <0.05 was considered as statistically significant.

Results

This study included 90 patients, of which 30% were female and 70% were male. The mean age was 50.9 ± 12.1 years. There was no significant difference between groups regarding demographic data and operation times [$P > 0.05$; Table 1].

Primary outcome measure: The mean VAS scores were significantly lower in the group pQLB and the group pTAPB than in the group Control at all-time points during 24 h postoperatively (pQLB < pTAPB < Control; $P < 0.001$; Table 2). VAS scores were lower than two during the postoperative 24 h in group pQLB. In group pTAPB, VAS scores were increased to >2 at the fourth hour postoperative period and remained between 2 and 3 at 8 and 12 h. In the group Control, VAS scores were increased to >3 at 4 h and remained between 3 and 4. Compared with the group Control, VAS scores were statistically lower at all-time points in the group TAPB except at 24 h ($P < 0.05$; Table 2; Figure 2).

Secondary outcome measures: Rescue analgesia was not required in the group pQLB during the study period. Rescue analgesia was given at all-time intervals in the TAP and Control groups (pQLB < pTAPB < Control; $P < 0.001$) [Table 3, Figure 3]. Rescue analgesic consumption was lower in the group TAPB than the group Control between 0 and 8 h ($P < 0.001$), but similar between 8 and 24 h ($P > 0.05$). The patients in the group pQLB did not use bolus demand on PCA in the first 4 h. The number of bolus demand on PCA and tramadol

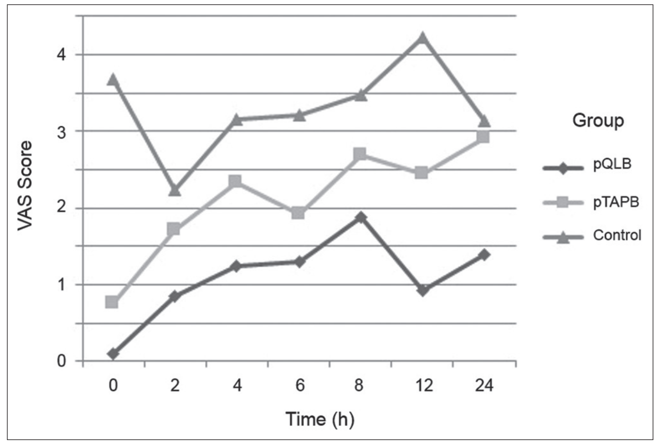

Figure 2: Visual analog scale scores in groups during the study period. pQLB = Posterior quadratus lumborum block, pTABP = posterior transversus abdominis plane block, VAS = visual analog scale, h = hours

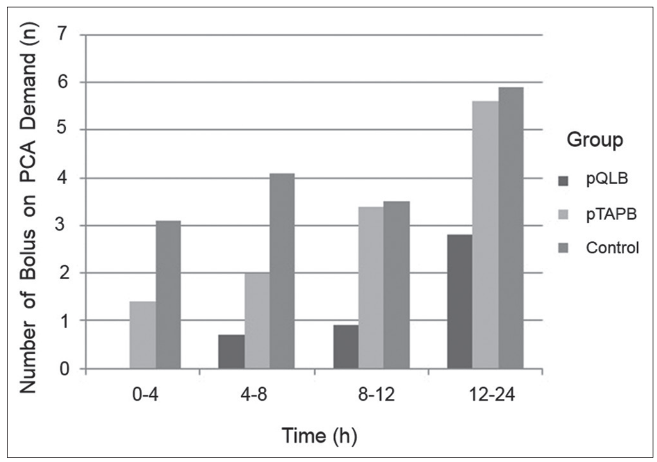

Figure 3: Number of bolus demand on patient-controlled analgesia in study groups

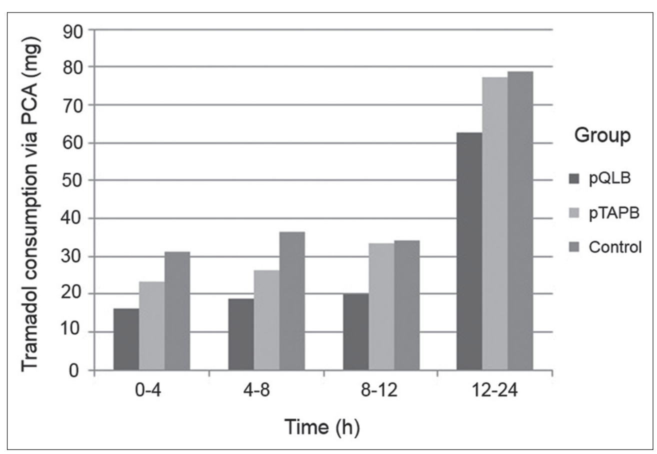

Figure 4: Tramadol consumption via patient controlled analgesia in study groups. pQLB = Posterior quadratus lumborum block, pTABP = posterior transversus abdominis plane block, h = hours

Table 1: Comparison of the demographic data between study groups

	Group pQLB (*n*=30)	Group pTAPB (*n*=30)	Group C (*n*=30)	*P*
Age (years)	49.9±11.8	51.7±11.6	51.1±11.5	0.862
Body mass index (kg m^{-2})	26.0±1.7	25.6±1.7	25.9±1.5	0.661
Gender (*n*, %)				
Female	10 (33.3%)	9 (30%)	8 (26.7%)	0.671
Male	20 (66.7%)	21 (70%)	22 (63.3%)	
ASA physical status (*n*, %)				
1	21 (70%)	20 (66.7%)	21 (70%)	0.917
2	9 (30%)	10 (33.3%)	9 (30%)	
Duration of surgery (min)	108.4±12.2	112.8±5.4	106±6.3	0.792

pQLB=Posterior quadratus lumborum block, pTABP=posterior transversus abdominis plane block, ASA=American Society of Anesthesiologists. Values are presented as mean±standard deviation, numbers and/or proportion (*n*, %). *P*<0.05 was considered as statistically significant

Table 2: Comparison of postoperative pain scores between study groups

	Group QLB (*n*=30)	Group TAPB (*n*=30)	Group Control (*n*=30)	*P*
Visual analog scale scores				
0 h	0.10±0.28	0.76±0.66	3.68±1.11	<0.001
2 h	0.84±0.75	1.72±0.61	2.24±0.60	<0.001
4 h	1.24±0.52	2.34±0.57	3.16±0.0	<0.001
6 h	1.30±0.91	1.92±0.28	3.22±0.4	<0.001
8 h	1.88±0.60	2.68±0.48	3.48±0.51	<0.001
12 h	0.92±0.28	2.44±0.49	4.22±0.18	<0.001
24 h	1.40±0.51	2.92±0.40	3.14±0.0	<0.001

pQLB=Posterior quadratus lumborum block, pTABP=posterior transversus abdominis plane block. Values are presented as mean±standard deviation. *P*<0.05 was considered as statistically significant

Table 3: Comparison of postoperative anesthetic management between study groups

	Group QLB (*n*=30)	Group TAPB (*n*=30)	Group Control (*n*=30)	*P*
Rescue analgesic consumption (mg)				
0-4 h	0.0±0.0	3.5±1.2	60.0±12.4 8	<0.001
4-8 h	0.0±0.0	5.1±2.4	17.3±7.8	<0.001
8-12 h	0.0±0.0	40.0±8.6	42.0±7.5	<0.001
12-24 h	0.0±0.0	33.4±9.5	35.6±10.0	<0.001
Number of bolus demand on PCA (*n*)				
0-4 h	0.0±0.0	1.4±0.8	3.10±0.7	<0.001
4-8 h	0.7±0.8	2.0±0.5	4.1±0.8	<0.001
8-12 h	0.9±0.7	3.4±1.0	3.5±0.9	<0.001
12-24 h	2.8±0.4	5.6±1.5	5.9±1.3	<0.001
Tramadol consumption via PCA (mg)				
0-4 h	16.0±0.0	23.3±3.8	31.3±3.2	<0.001
4-8 h	18.9±4.1	26.3±2.5	36.4±3.9	<0.001
8-12 h	19.8±3.6	33.4±5.5	34.0±4.3	<0.001
12-24 h	62.8±2.1	77.4±7.2	78.8±6.2	<0.001
Patient's satisfaction score (0-10)	9.2±0.3	7.8±0.8	6.4±1.1	<0.001

pQLB=Posterior quadratus lumborum block, pTABP=posterior transversus abdominis plane block, PCA=patient-controlled analgesia. Values are presented as mean±standard deviation. *P*<0.05 was considered as statistically significant

consumption via PCA was significantly lower in the group pQLB than pTAPB and Control group in the study period (*P* < 0.001, Table 3, Figures 4 and 5). The number of bolus demand on PCA and tramadol consumption via PCA and rescue analgesia was lower in the group TAPB than Control group between 0 and 8 h (*P* < 0.001), but similar between 8 and 24 h (*P* > 0.05). Only nausea and vomiting were observed in a total of six patients (two patients in each group) as a complication related to the anesthetic management. All patients were discharged from the hospital by the surgery department between postoperative 24 and 30 h. Patient satisfaction

Table 4: Randomized studies comparing posterior QLB with different types of TAP block in the literature

Surgery	Block	LA	RA	Results
Laparoscopic cholecystectomy[22]	Posteromedial QLB vs. lateral TAPB (bilat.)	Ropivacaine 0.375% 20 ml	IV-PCA morphine (2 mg on demand)	Lower VAS scores at 8, 12, 24 h during rest/movement; lower RA consumption at 6, 8, 12, 24, 36, and 48 h; longer first RA requirement time; higher postoperative analgesia satisfaction scores; lower PONV in group QLB
Laparoscopic cholecystectomy[9]	Posterior QLB vs. subcostal TAPB (bilat.)	Ropivacaine 0.375% 20 ml	Fentanyl 20 μg IV	No difference in VAS at 1, 6, 12, and 24 h, no difference in RA consumption; longer first RA requirement time; less patient required RA in group QLB, no difference in PONV
Caesarean section[24]	Posterior QLB vs. posterior TAPB (bilat.)	Ropivacaine 0.25% 0.2 ml kg^{-1}	Tramadol 100 mg IV	Lower VAS scores at rest/movement; lower RA consumption; longer first RA requirement time; less patient required RA in group QLB
Total abdominal hysterectomy[25]	Posterior QLB vs. lateral TAPB (bilat.)	Bupivacaine 0.25%, 20 ml	Morphine 3 mg IV	Lower VAS scores at rest/movement during 24 h; lower RA consumption; longer first RA requirement time; less patient required RA in group QLB
Laparoscopic colorectal surgery[23]	Posterior QLB vs. posterior TAPB (bilat.)	Ropivacaine 0.375%, 20 ml	IV-PCA sufentanil (3 μg on demand)	No difference in NRS scores; lower RA consumption at 24, 48 h, similar RA consumption at 6 h; the lower incidence of dizziness in group QLB
Unilateral inguinal hernia repair[26]	Posterior QLB vs. lateral TAPB (unilat.)	Bupivacaine 0.2% 0.5 ml kg^{-1}	Ibuprofen 7 mg kg^{-1} oral	Lower pain scores at 0.5, 1, 2, 4, 6, 12, and 24 h; less patient required RA; higher parent satisfaction scores in group QLB

LA=Local anesthetic, RA=rescue analgesic, QLB=quadratus lumborum block, TABP=transversus abdominis plane block, PCA=patient-controlled analgesia, VAS=visual analog scale, NRS=numerical rating scale, IV=intravenous

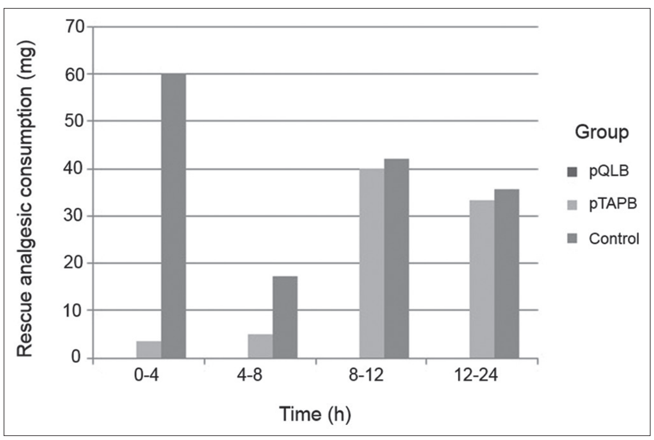

Figure 5: Rescue analgesic consumption in study groups. pQLB = posterior quadratus lumborum block, pTABP = posterior transversus abdominis plane block, h = hours

scores were highest in the group pQLB and lowest in the group Control (pQLB > pTAPB > Control; $P = 0.027$) [Table 3].

Discussion

The study results showed that both posterior QLB and TAPB provided a safe and effective postoperative analgesia after inguinal hernia surgery. The VAS scores remained lower than 3 in both groups compared to the group Control. A similarity in VAS scores was observed between pTAPB and group Control only at 24 h. pQLB provided superior analgesia than pTAPB because VAS scores, rescue analgesic consumption, and PCA use were significantly lower in all time points in the group pQLB. Additionally, rescue analgesia was not required during the study period, and also, patients in the group pQLB did not use the bolus button in the first 4 h. It should be noted that postoperative analgesic consumption as a rescue analgesic and via PCA was similar between pTAPB and group Control at postoperative 12 and 24 h. This finding suggested that pQLB resulted in longer postoperative pain relief compared to pTAPB. According to the results, it can be stated that pQLB provided better postoperative pain relief than the pTAPB in patients undergoing inguinal hernia surgery under GA. This was compatible with previous studies that indicated QLB is associated with a delay in rescue analgesic consumption than pTAPB.[9]

Many studies in the literature show that TAP block relieves postoperative pain and reduces the consumption of opioids in intraabdominal surgeries.[4] In some of the studies, LA doses were compared;[9,10] in Control and others, approach differences[11,12] were compared. As a result, it was thought that TAP block provided postoperative analgesia in intraabdominal pain. Between various TAPB techniques, lateral and posterior TABPs are generally used for postoperative analgesia in lower abdominal surgery.[13] The probe is located near or at the midaxillary line between the costal margin and the iliac crest in the lateral TAP block. LA is injected between the transversus abdominis and internal oblique muscles. The posterior TAP block is similar to the lateral TAPB, and only the probe is moved more posteriorly. The injection site is superficial to the aponeurosis of TAM near QLM.[4] In a meta-analysis by Abdallah *et al*.,[14] it was found that posterior TAPB provided prolonged analgesia compared to the lateral TAPB in lower abdominal surgeries. It has been stated that a more posterior block allows blocking of lateral cutaneous branches of thoracolumbar nerves. Posterior TAPB may also result in a retrograde LA spread that reaches to the paravertebral space and extends between T4 and L1 levels.

Six meta-analyses have been conducted in the last two years.[14-19] All meta-analyses revealed adequate data to conclude that QLB significantly relieves postoperative pain.

Blanko *et al*.[20] examined the effects of QLB versus placebo on morphine consumption by PCA. In this study, it was reported that they performed further studies with MRI (unpublished data) using two various injection points, the original one at the anterolateral side of the muscle and a second one, termed *QLB2*, at the posterior aspect of the muscle. Studies conducted QLB with block found that both blocks provided postoperative analgesia and decreased opioid consumption. Bagbanci *et al*.[21] compared QLB2 and QLB3 and found a decreased postoperative opioid consumption and lower pain scores than the control group in open inguinal hernia surgery with spinal anesthesia.

When reviewing the literature, there are six randomized studies which compared posterior QLB with different types of TAPBs regarding postoperative analgesia [Table 4]. Da Huang *et al*.[22] compared different approaches of QL and TAP blocks in postoperative colorectal surgical pain. The standardized postoperative analgesic regimen consisted of 1 g of paracetamol every 8 h, 40 mg of parecoxib every 12 h, and an IV bolus of morphine administered using PCA device up to 48 h postoperatively. In the multimodal analgesia approach, ketamine and LA infiltration were not used, but it was concluded that the blocks contributed to postoperative analgesia.[20] In our study, intraoperative paracetamol and tenoxicam were given as standard. Later, in addition to the multimodal analgesic methods, IV tramadol PCA was given, and rescue analgesia was used. Although there was not a control group in their studies, our results were compatible with that study. They found lower VAS scores at 8, 12, and 24 h and rescue analgesic consumption at 6, 8, 12, 24, 36, and 48 h, longer first rescue analgesic requirement time, higher postoperative analgesia satisfaction scores, and lower PONV in group QLB. Hazem El Sayed *et al*.[9] compared bilateral pQLB and subcostal transversus abdominal plane block for postoperative analgesia following laparoscopic cholecystectomy. They used Ketorolak in PACU as a part of multimodal analgesia. They found no difference in VAS at 1, 6, 12, and 24 h, no difference in rescue analgesic consumption, longer first rescue analgesic requirement time, less patient required rescue analgesic in group QLB, and no difference in PONV. Among them, two studies have compared bilateral posterior QLB with bilateral posterior TAPB. Both studies reported a lower rescue analgesic consumption favoring QLB, but one study reported similar VAS scores,[23] whereas the other study reported lower VAS scores in the group QLB.[24] Yousef *et al*.[25] have compared bilateral posterior QLB with bilateral posterior TAPB in patients undergoing total abdominal hysterectomy. They found lower VAS scores at rest/movement during 24 h, lower rescue analgesic consumption, longer first rescue analgesic requirement time, and less patient required rescue analgesic in group QLB. Öksüz *et al*.[26] compared posterior QLB to lateral TAB block in children undergoing low abdominal surgery. They found lower pain scores at 0.5, 1, 2, 4, 6, 12, and 24 h, less patient required rescue analgesic, and higher patient satisfaction scores in group QLB.

The studies comparing posterior QLB with the other QLB blocks have addressed that posterior QLB block provided a more predictable LA spread.[15] Also, the approach was more superficial and had a longer distance from the intraabdominal viscera. Thus, the posterior QLB block was considered as a safer block to perform.[2] For these reasons, posterior approaches of both blocks were selected for inguinal hernia surgery in this study.

Several mechanisms may explain postoperative analgesia differences between two blocks: (a) QLBs might spread more extensive than TAPBs. In QLBs, LA can spread along with the transversalis fascia plane in the abdominal wall that is continuous with the endothoracic fascia in the thoracic wall. That result in a LA spread in a cranial direction between ribs and endothoracic membrane and possibly to the thoracic paravertebral space. Thus, QLB might act as an indirect thoracic paravertebral block.[27] (b) Paravertebral space and thoracolumbar plane contain mechanoreceptors and multiple sympathetic fibers. The spread of LA to these areas results in extensive and somatic visceral analgesia in QLBs compared to TAPBs. TAP blockade is limited to somatic anesthesia of the abdominal wall.[5] (c) The thoracolumbar fascia and endothoracic fascia are filled with adipose tissue. The local tissue perfusion is low in adipose tissue, resulting in reduced absorption speed of LA into the blood in QLB blocks, which prolongs the sensory block provided by QLB compared to TAPB.[24]

This study has several limitations. First, the extension of sensory blocks was not evaluated between groups which might provide valuable information about the LA spread. Second, postoperative pain was only assessed at rest. Third, the discharge times were not compared between groups because the surgical clinic decides on the patient's discharge time in our hospital.

Conclusion

It is concluded that posterior QLB provided superior postoperative pain relief than the posterior TAPB due to the lower pain scores, reduced use of rescue analgesia and PCA, longer duration of pain relief, and higher patient satisfaction scores.

Ethical standards

All procedures performed in studies involving human participants or on human tissue followed the institutional and national research committee's ethical standards and with the 1975 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

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Ethical approval

The approval was given by the University of Medical Science, Yıldırım Beyazıt Training and Research Hospital (11.11.2019-75/08).

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Nil.

Conflicts of interest

There are no conflicts of interest.

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