

Comparison of the postoperative analgesic effect of transversus abdominis plan block and quadratus lumborum block: A prospective randomized study

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Abstract

Background and Aims: In this study, we aimed to compare the transversus abdominis plan block (TAP) and quadratus lumborum block (QL) efficacy for postoperative analgesia in patients undergoing varicocelelectomy under spinal anesthesia.

Methods: American Society of Anesthesiologists (ASA) 1 and 2 patients, aged 18–45 years, who underwent varicocelelectomy operation under elective conditions, were included. Eighty patients were divided into three groups as TAP group, QL group, and control group by prospective randomization. The patients were operated under spinal anesthesia. At the end of the operation, TAP was applied to the TAP group with a posterior approach using ultrasound (USG) in the supine position. To the QL group, the patient was placed in the lateral decubitus position and the lateral QL was applied via USG. No block type was applied to the control group. Patient-controlled analgesia (PCA) device containing tramadol was administered intravenously at the end of the surgery in all groups. Visual analogue scale (VAS) score was questioned at 0, 2, 4, 6, 8, 10, 12, 18, 24 h in the follow-up of the patients. Intravenous 1 g paracetamol was given over VAS 4. PCA usage time and usage amounts were recorded.

Results: As a result of comparing the groups according to the VAS scores at all hours were significantly different between the three groups ($p < 0.001$). There was a significant difference between the groups when comparing the number of PCA bolus administrations ($p < 0.001$). TAP and QL blocks significantly reduced the number of PCA bolus when compared with the control group ($p < 0.001$) but the number of PCA bolus was found to be similar between TAP and QL blocks ($p > 0.05$).

Conclusion: TAP and QL, which are administered to evaluate the effectiveness of postoperative analgesia in patients undergoing varicocelelectomy under spinal anesthesia, are both effective in reducing pain scores and the amount of analgesia consumption.

KEYWORDS

abdominal muscles, analgesia, anesthesia, pain, varicocele

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1 | INTRODUCTION

Surgical procedures cause pain due to tissue trauma and repetitive stimuli. Despite advances in surgical treatment and the postoperative process, postoperative pain is one of the most common problems for patients. One of the most important expectations in the postoperative period is to be comfortable with minimal pain.¹ Transversus abdominis plane block (TAP) and quadratus lumborum block (QL) are regional anesthetic techniques that are becoming increasingly popular for anterior abdominal wall and lower abdominal surgeries. TAP is a regional anesthetic technique in which a local anesthetic is applied between the internal oblique muscle and the transversus abdominis muscle, defined by Rafi in 2001.² In 2007, Hebbard et al. described an ultrasound-guided approach for the TAP. Ultrasound guidance is now considered the gold standard for TAP.³ The TAP can be used as part of an analgesic regimen for abdominal surgery. The TAP, which is known in the literature to be used for cesarean surgery, lower abdominal surgical procedures such as hernia repair, appendectomy, abdominal hysterectomy, abdominoplasty, and prostatectomy, can also be performed for laparoscopic procedures or midline incision surgical procedures, taking care not to exceed the recommended local anesthetic dose.⁴

QL was first described by Dr. Blanco.⁵ In the current literature, the use of QL with ultrasound (USG) is preferred, and QL1, QL2, QL3, and intramuscular QL types are defined according to the region where the block is applied. QL1 is applied laterally to the quadratus lumborum muscle under the aponeurosis of the transversus abdominis muscle, QL2 between quadratus lumborum muscle and the latissimus dorsi muscle behind the quadratus lumborum muscle, QL3 between quadratus lumborum muscle and the psoas major muscle in front of the quadratus lumborum muscle, and QL intramuscularly into the quadratus lumborum muscle.⁶ The QL produces a broad distribution of local anesthetics, resulting in widespread sensory inhibition (from T7 to L1 in most cases). The sensory fibers of both the upper ureter and testis pass through spinal cord segments T11 and T12. Therefore, QLs can be used for postoperative analgesia in abdominal, gynecologic-obstetric, urologic, and pelvic procedures.⁷

Varicocele surgery accounts for a large proportion of urologic procedures and is used to treat infertility.⁸ Varicocele is an unusual dilatation of the seminal vasculature due to an anatomical abnormality and occurs with a frequency of 10%–20% in the general male population. Varicoceles can affect several seminal parameters, including sperm production. It has been shown that 19%–41% of patients evaluated in infertility clinics have a varicocele, and the incidence of varicocele in men with secondary infertility is as high as 80%.⁹ Among the techniques used to treat varicocele, microscopic varicocelectomy has the greatest postoperative improvement in semen parameters and fertility rates and the lowest postoperative complication rates.¹⁰ There are very few studies in the literature on the evaluation and management of postoperative pain in varicocelectomy. Our study aimed to compare the efficacy of TAP and QL for postoperative pain in patients undergoing subinguinal microsurgical varicocelectomy under spinal anesthesia.

2 | METHODS

CONSORT 2010 Checklist for randomized studies were used for this manuscript (Appendix S1). The Ethics Committee of Kahramanmaraş Sutcu Imam University Medical Faculty Health Practice and Research Hospital received approval of meeting 2018/15 and decision no. 21 on 29/08/2018.

A total of 80 patients who presented to the Urology Department between September 2018 and March 2020 and underwent varicocelectomy due to a varicocele diagnosis were included. The study included the American Society of Anesthesiologists (ASA) I and II patients aged 18–45 years who were scheduled for surgery under spinal anesthesia. Patients were informed about the study, and those who consented gave informed consent. Study patients were randomly divided into three groups: the TAP group ($n = 26$), the QL group ($n = 26$), and the control group ($n = 28$), using the lottery method. All three groups of patients underwent spinal anesthesia. Patients with contraindications to spinal anesthesia, coagulopathy, known allergies to the drugs to be used, surgical site infections, and involuntary patients were excluded from the study. The study was terminated in case of unsuccessful spinal block, conversion to general anesthesia, and patient refusal of the procedure. Our study was conducted in accordance with the Declaration of Helsinki as a prospective and randomized controlled trial (http://www.journalagent.com/aot/Helsinki_Declaration_tur.pdf).

Before the patient was brought to the operating table, peripheral vascular access was established with an intravenous (iv) cannula, and 10 ml/kg of isotonic solution was administered within 30 min. After the patient was brought to the operating table, 0.03 mg/kg midazolam was administered intravenously for premedication. Patients were monitored on the operating table with standard general anesthesia monitoring (electrocardiography, noninvasive blood pressure monitoring, pulse oximetry). Suitable conditions were also provided despite the possibility of switching to general anesthesia.

For administration of spinal anesthesia, the patient was placed in a sitting position and the L4–5 area was determined. Under sterile conditions, 1–2 ml of 1% lidocaine was applied to the skin and subcutaneous area. After entering the subdural space with a 25-G Quincke spinal needle and observing Cerebrospinal fluid flow, 2.5–3 ml of 0.5% hyperbaric bupivacaine was injected. During follow-up, 0.5 mg atropine and 10 mg ephedrine were kept on hand for the development of hypotension. After spinal anesthesia, the block level was checked using the Bromage scale,¹¹ and surgery could begin. Patients who could not produce a block were excluded from the study.

Patients operated on with the Ivanissevich technique, in which the surgeon made an incision approximately 4–5 cm long in the subinguinal region, were prepared for block after completion of surgery.

2.1 | Application of TAP

USG settings (MyLab™ Five; esaote) were made for the patients who would undergo TAP. The skin area to be blocked in the supine

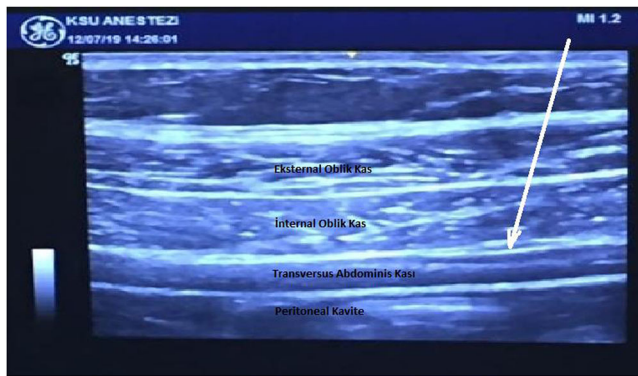


FIGURE 1 Ultrasound imaging of transversus abdominis plane block application. Eksternal Oblik, external oblique muscle; Internal Oblik, internal oblique muscle; Peritoneal Kavite: peritoneal cavity; Transversus Abdominis, transverse abdominis muscle.

position was sterilized with a batikon. The lumbar petit region was determined and placed on the lateral abdominal wall in the midaxillary line between the iliac crest and the inferior costal arch using a linear probe (12–15 MHz probe). The probe was moved from cephalad to caudal, from top to bottom, and at an angle to obtain an ideal image. After identifying the internal oblique muscle as the thickest muscle and the transversus abdominis muscle as the thinnest muscle, a 100 mm 22 gauge (G) needle (Stimuplex® Ultra 360®, 0.9 × 100 mm) was placed in the same plane (in-plane or long axis technique) as the USG probe. The progression of the needle was observed on the ultrasound image with the sensation of a facial click. After the second click was felt between the internal oblique fascia and the transversalis fascia, negative aspiration confirmed that there was no blood flow. The position of the needle was corroborated with 0.5–1 ml of saline (SF). When switching to local anesthetic injection, 20 ml of 0.5% bupivacaine diluted 1:1 with SF was applied bilaterally. This proved the absence of blood every 5 ml with negative aspiration and observed elliptical separation between the fascial layer (Figure 1).

2.2 | Application of QL

Patients in whom QL1 was to be applied were placed in the lateral decubitus position. After USG settings were made, sterile conditions were created and a low-frequency convex probe was placed between the costal margin and the iliac crest. The three abdominal muscle layers (external oblique, internal oblique, transversus abdominis) were moved posteriorly to identify the TLF and the back muscles (quadratus lumborum, psoas major, erector spinae, and latissimus dorsi). A Shamrock marker was used to ensure visibility. After selecting the muscle QL, a 100 mm 22 G needle was inserted with an in-plane approach and advanced from the anterior abdominal muscles to the anterolateral border of QL. After negative aspiration and test dose, a 0.5% bupivacaine concentration was diluted with 1:1 saline and applied bilaterally in 20 ml doses (Figure 2).

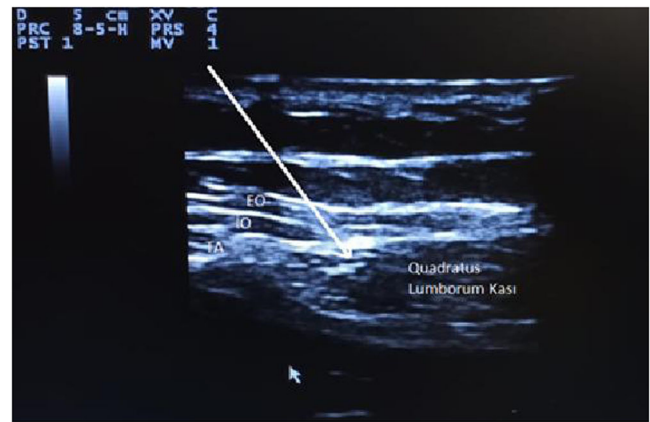


FIGURE 2 Quadratus lumborum block USG image. EO, external oblique muscle; IO, internal oblique muscle; TA, transverse abdominis muscle; USG, ultrasound.

2.3 | Control group

After surgery under spinal anesthesia, no block was performed in patients in the control group.

We used tramadol for postoperative patient-controlled analgesia (PCA). At the end of surgery, the PCA device (CADD®-Solis 2110; Smiths Medical) containing tramadol via infusion was brought to the service, and the purpose and method of use was explained to all three groups. The PCA device was programmed for a bolus dose of 25 mg tramadol, a lock time of 20 min, and no additional basal infusion.

In-service nurses were informed about patient follow-up. Visual analog scale (VAS) scores, need for additional analgesics, complaints of nausea and vomiting, and patient satisfaction were recorded at 2, 4, 6, 8, 10, 12, 18, and 24 h. Patients with VAS 4 or more received 1 g iv paracetamol. The number of PCA boluses were recorded.

2.4 | Statistical analysis

In the data analysis, the conformity of the variables with the normal distribution was examined using the Shapiro–Wilk test. The Kruskal–Wallis H test was used to compare the groups in which no normal distribution was found. Distributional differences between categorical variables were assessed with Fisher's exact test and χ^2 test. Statistical significance was accepted as $p < 0.05$. Tests were two sided. Number (n), percent (%), median (min–max), and mean \pm SD were used to express statistical parameters. Data were analyzed using IBM SPSS version 22 (IBM SPSS for Windows version 22; IBM Corporation).

3 | RESULTS

Ninety-three patients were selected for the study, but 13 patients were excluded for various reasons. Five of them were excluded from the study because they were ASA III. Two

patients were excluded because they had additional psychiatric diagnoses and treatments, and one patient was excluded because he had a previous varicocelelectomy. One patient in the TAP group and two patients in the QL group were excluded because of conversion to general anesthesia. One patient in each TAP and

control group was excluded from the study because of problems with the PCA device and patient intolerance (Figure 3). TAP, QL and control groups, 26 in each of the TAP and QL groups and 28 in the control group, a total of 80 patients with ASA 1 and 2 were enrolled in the study.

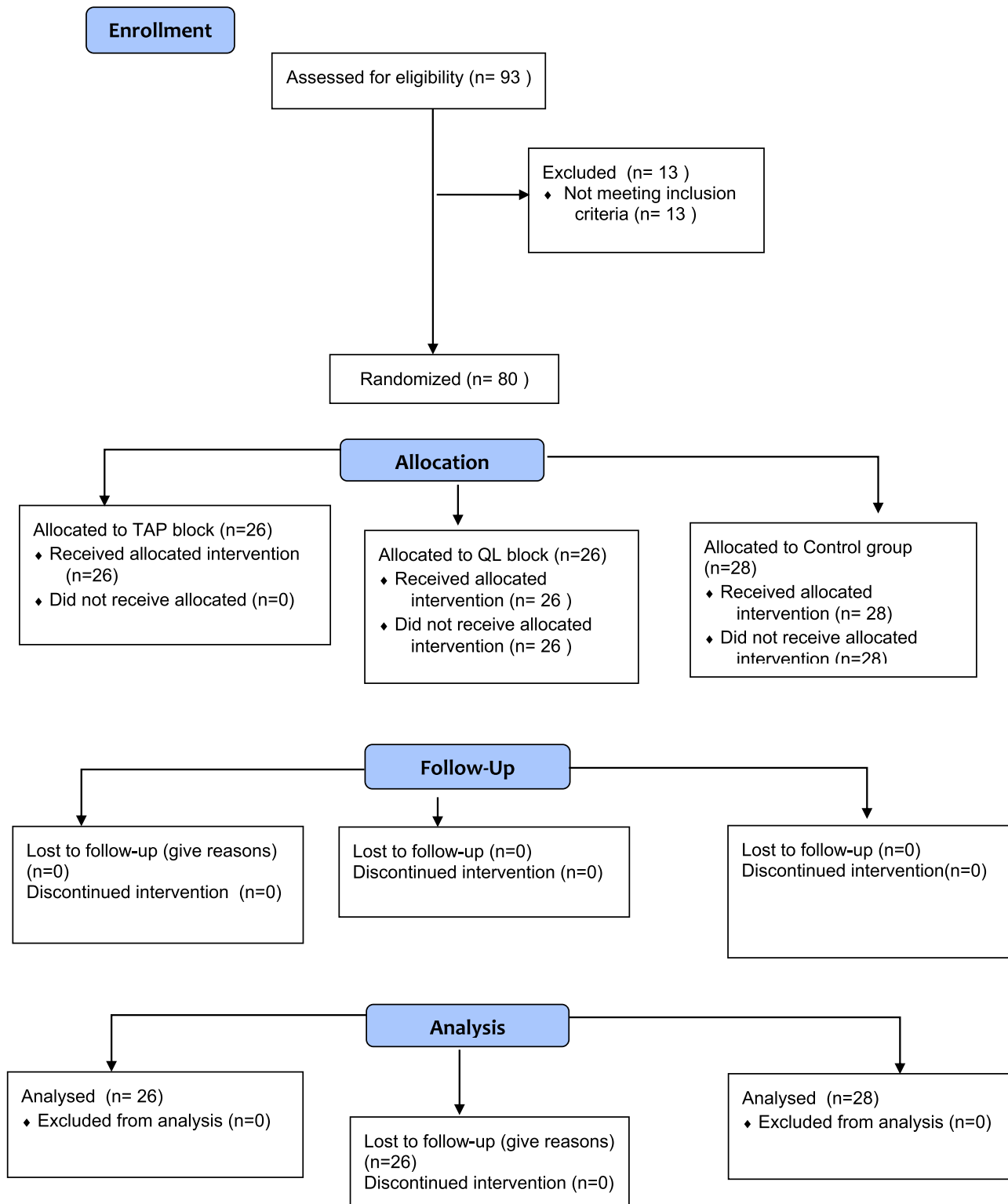


FIGURE 3 Consort flow diagram. QL, quadratus lumborum block; TAP, transversus abdominis plane block.

The groups were found to be similar in terms of demographic data such as age ($p = 0.602$), Basal Metabolism Index (BMI) ($p = 0.165$), ASA class ($p = 0.149$), and direction of surgery ($p = 0.196$) (Table 1).

As a result of comparing the groups median according to the 0-, 2-, 4-, 6-, 8-, 10-, 12-, 18-, and 24-h score VAS, a significant difference was found between the TAP and control groups and between QL and the control group on the VAS 0th hour scores there was a significant difference between the groups with respect to all

measures of the VAS score (Median TAP-QL-Control: 2 (1-2), 1 (1-2), 3 (2-4); $p < 0.001$) and VAS scores at all other hours were significantly different between the three groups ($p < 0.001$) (Table 2). While both the TAP and QL blocks resulted in a decrease in VAS scores compared with the control group, the QL was more effective than the TAP (Figure 4). In the analysis performed by comparing the VAS scores between the TAP and QL groups, the VAS was found to be $p = 0.005$ for the 0th hour, Median TAP-QL: 2 (1-2),

TABLE 1 Distribution of groups according to the variables age, BMI, ASA class, and direction of surgery

	TAP group		QL group		Control group		p
	n	%	n	%	n	%	
Age (mean \pm SD)	30.85 \pm 5.19		30.88 \pm 5.95		29.93 \pm 6.35		$z = 1.016$ 0.602 ^a
BMI (mean \pm SD)	32.55 \pm 3.48		25.27 \pm 3.47		25.90 \pm 3.44		$z = 2.289$ 0.165 ^a
ASA							
1	18	69.2	14	53.8	12	42.9	$\chi^2 = 3.810$ 0.149 ^b
2	8	30.8	12	46.2	16	57.1	
Surgery							
Bilateral	11	42.3	16	61.5	18	64.3	$\chi^2 = 5.203$ 0.196 ^c
Right	0	0.0	1	3.8	0	0.0	
Left	15	57.7	9	34.6	10	35.7	

Note: Bold values statistically significance $p < 0.05$.

Abbreviations: ASA, American Society of Anesthesiologists; BMI, Basal Metabolism Index; SD, standard deviation.

^aKruskal-Wallis test: z .

^b χ^2 .

^cFisher exact test was used.

TABLE 2 Comparison of groups by VAS score

	TAP			QL			Control			p*
	Med	Min	Max	Med	Min	Max	Med	Min	Max	
VAS 0	2.0	1.0	2.0	1.0	1.0	2.0	3.0	2.0	4.0	<0.001 ^{ac,bc}
VAS 2	3.0	2.0	4.0	2.0	1.0	3.0	4.0	4.0	7.0	<0.001 ^{a,b,c}
VAS 4	3.0	2.0	3.0	2.0	1.0	3.0	4.0	3.0	6.0	<0.001 ^{a,b,c}
VAS 6	3.0	2.0	3.0	2.0	1.0	3.0	4.0	3.0	4.0	<0.001 ^{a,b,c}
VAS 8	2.0	2.0	3.0	2.0	1.0	3.0	3.0	3.0	4.0	<0.001 ^{a,b,c}
VAS 10	2.0	2.0	3.0	1.5	1.0	2.0	3.0	3.0	4.0	<0.001 ^{a,b,c}
VAS 12	2.0	1.0	3.0	1.0	1.0	2.0	3.0	3.0	4.0	<0.001 ^{a,b,c}
VAS 18	2.0	1.0	2.0	1.0	1.0	2.0	3.0	2.0	4.0	<0.001 ^{a,b,c}
VAS 24	2.0	1.0	2.0	1.0	1.0	2.0	3.0	2.0	3.0	<0.001 ^{a,b,c}

Note: Bold values statistically significance $p < 0.05$. ^a(TAP), ^b(QL), ^c(Control): The group from which the difference originates; ^{ab}Statistically significant difference between the TAP group and the QL group; ^{ac}Statistically significant difference between the TAP group and the control group; ^{bc}Statistically significant difference between the QL group and the control group.

Abbreviations: Max, maximum; Med, median; Min, minimum; QL, quadratus lumborum block; TAP, transversus abdominis block; VAS, visual analog scale.

*Kruskal-Wallis test.

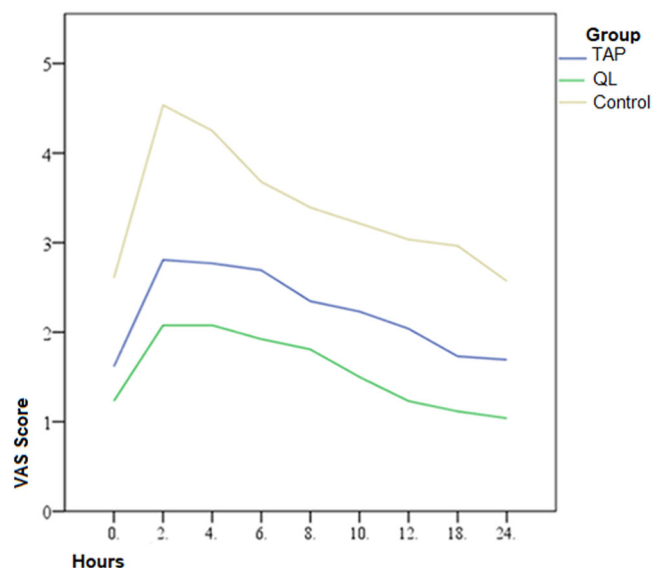


FIGURE 4 Comparison of groups according to the VAS score (median). QL, quadratus lumborum block; TAP, transversus abdominis plane block; VAS, visual analog scale.

TABLE 3 Comparison of TAP and QL groups according to the VAS score

	TAP group			QL group			p^a
	Median	Min	Max	Median	Min	Max	
VAS 0	2.0	1.0	2.0	1.0	1.0	2.0	0.005
VAS 2	3.0	2.0	4.0	2.0	1.0	3.0	<0.001
VAS 4	3.0	2.0	3.0	2.0	1.0	3.0	<0.001
VAS 6	3.0	2.0	3.0	2.0	1.0	3.0	<0.001
VAS 8	2.0	2.0	3.0	2.0	1.0	3.0	<0.001
VAS 10	2.0	2.0	3.0	1.5	1.0	2.0	<0.001
VAS 12	2.0	1.0	3.0	1.0	1.0	2.0	<0.001
VAS 18	2.0	1.0	2.0	1.0	1.0	2.0	<0.001
VAS 24	2.0	1.0	2.0	1.0	1.0	2.0	<0.001

Note: Bold values statistically significance $p < 0.05$.

Abbreviations: Max, maximum; Min, minimum; QL, quadratus lumborum block; TAP, transversus abdominis block; VAS, visual analog scale.

^aMann-Whitney U test was applied.

TABLE 4 Comparison of groups according to the values of PCA bolus number

	TAP group			QL group			Control			p^*
	Med	Min	Max	Med	Min	Max	Med	Min	Max	
PCA bolus number	4.0	0.0	8.0	3.0	0.0	7.0	6.5	2.0	13.0	<0.001 ^{ac, bc}

Note: Bold values statistically significance $p < 0.05$. ^a(TAP), ^b(QL), ^c(Control): The group from which the difference originates; ^{ab}Statistically significant difference between the TAP group and the QL group; ^{ac}Statistically significant difference between the TAP group and the control group; ^{bc}Statistically significant difference between the QL group and the control group.

Abbreviations: Max, maximum; Med, median; Min, minimum; PCA, patient-controlled analgesia; QL, quadratus lumborum block; TAP, transversus abdominis block.

*Kruskal-Wallis test was used.

1 (1–2) and the VAS $p < 0.001$ for all the other hours, the VAS score at all hours was significantly lower in the QL group than in the TAP group (Table 3).

There was a significant difference between the groups when comparing the number of PCA bolus administrations (median TAP-QL-control: 4 (0–8), 3 (0–7), 6.5 (2–13); $p < 0.001$) (Table 4; Figure 5). Post-Hoc evaluation of the comparison of groups according to PCA bolus number values; TAP and QL blocks significantly reduced the number of PCA bolus when compared with the control group (TAP-Control $p = 0.002$, QL-Control $p < 0.001$) but the number of PCA bolus was found to be similar between TAP and QL blocks ($p = 0.567$) (Table 5; Figure 6).

The incidence of postoperative nausea and vomiting differed significantly between the groups and was mostly found in the control

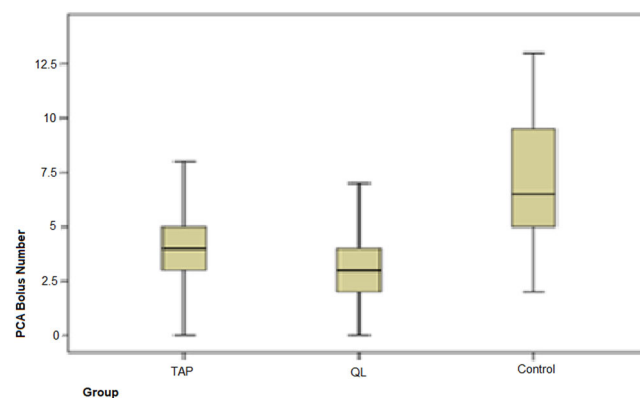


FIGURE 5 Comparison of the groups according to the PCA bolus number value (median). PCA, patient-controlled analgesia; QL, quadratus lumborum block; TAP, transversus abdominis plane block.

TABLE 5 Post-Hoc evaluation of the comparison of groups according to PCA bolus number values

	TAP-QL	TAP-Control	QL-Control
PCA bolus number	0.567	0.002	<0.001

Note: Bold values statistically significance $p < 0.05$. Dunnet T3 test.

Abbreviations: QL, quadratus lumborum block; PCA, patient-controlled analgesia; TAP, transversus abdominis block.

group (TAP-QL-Control: 7.7%, 0%, 39.3%; $p < 0.001$) (Table 6). Patient satisfaction also differs significantly between groups and the very satisfied state was most frequently observed in the QL group (TAP-QL-Control: 26.9%, 34.6%, 0%; $p < 0.001$) (Table 6).

4 | DISCUSSION

Relieving postoperative pain caused by the surgical procedure has positive effects such as patient comfort, rapid recovery, early discharge, and nonchronicity of pain. Similarly, it is necessary to increase the number of studies performed to ensure that patients have the most pain-free postoperative period possible. We concluded that although TAP and QL blocks reduce postoperative analgesic consumption in varicocele surgery, QL block is superior to TAP block in reducing VAS scores.

Erbabacan et al.¹² compared the first 24-h postoperative analgesic efficacy of USG-assisted TAP with iv PCA with morphine in patients undergoing lower abdominal surgery. They administered

0.5% bupivacaine and 1% lidocaine with 30 ml TAP to one group and PCA with iv morphine to the other group. Tran et al.¹³ showed that T10-L1 nerves were affected by injecting 20 ml of aniline dye into the neurofascial area using USG, and they emphasized that this technique may be limited to lower abdominal procedures. In our study, we applied TAP and QL1 blocks because the area we wanted to provide postoperative analgesia after varicocele surgery was compatible with T10-L1. Although local anesthetic systemic toxicity related to QL and TAP block has not been reported in the literature, we preferred a smaller volume of 20 ml because the local anesthetic concentration detected in plasma in TAP block was observed to be higher than in QL block.¹⁴

Liu et al.¹⁵ compared TAP and QL blocks in terms of pain management in patients undergoing abdominal surgery. Statistically significant differences were observed between the two groups in postoperative pain scores at 2, 4, 6, 12, and 24 h. Morphine consumption at 24 h was lower in patients undergoing QL, and postoperative analgesia time was longer. It has been noted that QL block provides better pain management with less opioid consumption than TAP block after abdominal surgery. We also observed that both TAP and QL blocks can provide adequate postoperative analgesia in varicolectomy surgery and QL block will be more successful in this regard. In our study, we concluded that QL block decreased VAS scores more than TAP block; however, the difference between the two groups in terms of PCA use was not statistically significant. We can explain the lower VAS scores based on the idea that postoperative PCA analgesic demands were the same in both groups, since QL1 block in our study was applied to a similar anatomical area with the TAP block, but QL block may extend to the thoracic and lumbar paravertebral areas in general.¹⁶

Altın¹⁷ found that postoperative morphine consumption was significantly lower in the TAP group during laparoscopic nephrectomies in which the TAP was applied along with PCA and pure morphine PCA for postoperative analgesia. When the TAP group was compared with the control group in our study, the VAS scores and the amount of PCA analgesics consumed at postoperative hours 2, 4, 6,

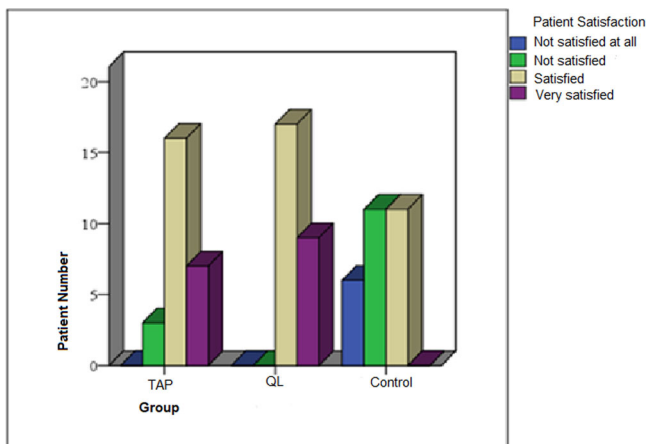


FIGURE 6 Comparison of groups in terms of patient satisfaction (n). QL, quadratus lumborum block; TAP, transversus abdominis plane block.

TABLE 6 Comparison of groups in terms of postoperative nausea and vomiting and patient satisfaction

	TAP group		QL group		Control group		p^a
	n	%	n	%	n	%	
Postoperative nausea and vomiting							
Absent	24	92.3	26	100.0	17	60.7	<0.001
Present	2	7.7	0	0.0	11	39.3	
Patient satisfaction							
Not satisfied at all	0	0.0	0	0.0	6	21.4	<0.001
Not satisfied	3	11.5	0	0.0	11	39.3	
Satisfied	16	61.5	17	65.4	11	39.3	
Very satisfied	7	26.9	9	34.6	0	0.0	

Note: Bold values statistically significance $p < 0.05$.

Abbreviations: QL, quadratus lumborum block; TAP, transversus abdominis block.

^aFisher exact test was used.

8, 10, 12, 18, and 24 were found to be significantly lower in the TAP group. We preferred tramadol to avoid the respiratory depressant side effects of morphine.¹⁸

Ueshimo and Otake¹⁹ performed a retrospective study of 2382 patients who had undergone different types of QL and compared the presence of muscle weakness and side effects of each type of block. QL1, QL2, QL3, and intramuscular QL blocks were performed. The percentage of cases in which quadriceps muscle weakness occurred after lateral, posterior, anterior, and intramuscular QL blocks were 1%, 19%, 90%, and 0%, respectively. Rare complications of the use of TAP include intraperitoneal injection, transient injury to visceral organs, and transient paralysis of the femoral nerve.⁴ Wikner et al.²⁰ reported unilateral, transient weakness of hip flexion and knee extension after applying a lateral QL in their patients after laparoscopic abdominal surgery. In our study, we performed both blocks under ultrasound guidance. No complication was observed during the application of the block and in the patient's follow-up.

We think that varicocele surgery is a rare type of surgery that has been studied in terms of lower abdominal surgery and the efficacy of block, and the application of TAP and QL is a good alternative to avoid overdose and side effects of systemic analgesics. Postoperative VAS scores were significantly lower in the TAP and QL groups compared to the control group. Postoperative nausea-vomiting rate was lower in the block applied groups than the control group and it was statistically significant. Patient satisfaction was significantly higher in the control group for both groups. In the pairwise comparison, QL block was found to be lower than TAP block and higher in analgesia quality as VAS scores.

A limitation of our study was that postoperative dermatome examination could not be performed in patients who underwent block at the end of surgery. This was because patients had to be constantly changed in the operating room and the diminishing effect of spinal anesthesia could lead to misleading examination results.

5 | CONCLUSION

In conclusion, in our study of patients undergoing varicocele surgery, we observed that although TAP and QL blocks cause similar analgesic consumption in the postoperative period, QL block provides lower postoperative VAS scores. We suggest that an experienced team and ultrasound-guided QL block should be kept in mind as an option for postoperative analgesia methods in young patients undergoing varicocele surgery.

AUTHOR CONTRIBUTION

Gülşah Öncü: Writing—original draft preparation. **Feyza Çalışır and Gülşah Öncü:** Writing—review and editing. **Ömer Faruk Boran and Bora Bilal:** Conceptualization. **Hafize Öksüz:** Supervision. **Yavuz Orak:** Methodology. All authors have read and approved the final version of the manuscript.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The authors confirm that the data supporting the findings of this study are available within the article and its supplementary materials. Gülşah Öncü, Gülşah Öncü, Gülşah Öncü had full access to all of the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

TRANSPARENCY STATEMENT

The Gülşah Öncü affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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REFERENCES

- Loeser JD, Melzack R. Pain: an overview. *Lancet*. 1999;353(9164):1607-1609.
- Rafi AN. Abdominal field block: a new approach via the lumbar triangle. *Anesthesia*. 2008;56(10):1024-1026.
- Hebbard P, Fujiwara Y, Shibata Y, Royse C. Ultrasound-guided transversus abdominis plane (TAP) block. *Anaesth Intensive Care*. 2007;35(4):616-617.
- Mukhtar K. Transversus abdominis plane (TAP) block. *J School Reg Anesth*. 2009;12:28-32.
- Blanco R. Tap block under ultrasound guidance: the description of a "no pops" technique. *Reg Anesth Pain Med*. 2007;32(suppl 1):130.
- Ueshima H, Otake H, Lin JA. Ultrasound-guided quadratus lumborum block: an updated review of anatomy and techniques. *BioMed Res Int*. 2017;2017:2752876.
- Børglum J, Moriggl B, Jensen K, et al. Ultrasound-guided transmuscular quadratus lumborum blockade. *Br J Anaesth*. 2013;110:3.
- Jensen CFS, Østergren P, Dupree JM, Ohl DA, Sønksen J, Fode M. Varicocele and male infertility. *Nat Rev Urol*. 2017;14(9):523-533.
- Aşçı R, Açıkgöz A. Varikosel: insidans, etioloji ve fizyopatoloji. *Türkiye Klinikleri J Urology-Special Topics*. 2012;5(3):6-15.
- Çayan S. Varikosel tedavisinde prognostik faktörler ve teknikler. *Türkiye Klinikleri J Urology-Special Topics*. 2012;5(3):47-50.
- Bromage PR. A comparison of the hydrochloride and carbon dioxide salt of lidocaine and prilocaine in epidural analgesia. *Acta Anaesthesiol Scand Suppl*. 1965;16:55-69.
- Erbabacan E, Kendigelen P, Köksal GM, et al. Comparison of transversus abdominis plane block and IV patient-controlled analgesia after lower abdominal surgery. *Turk J Anaesthesiol Reanim*. 2015;43(1):24-28.
- Tran TM, Ivanusic JJ, Hebbard P, Barrington MJ. Determination of spread of injectate after ultrasound-guided transversus abdominis plane block: a cadaveric study. *Br J Anaesth*. 2009;102(1):123-127.

14. Akerman M, Pejčić N, Veličković I. A review of the quadratus lumborum block and ERAS. *Front Med.* 2018;5:44.
15. Liu X, Song T, Chen X, et al. Quadratus lumborum block versus transversus abdominis plane block for postoperative analgesia in patients undergoing abdominal surgeries: a systematic review and meta-analysis of randomized controlled trials. *BMC Anesthesiol.* 2020;20(1):53.
16. Balocco AL, López AM, Kesteloot C, et al. Quadratus lumborum block: an imaging study of three approaches. *Reg Anesth Pain Med.* 2021; Jan 46(1):35-40.
17. Altın S, Akesen YS, Yavaşcaoğlu B. Laparoskopik nefrektomide ağrı kontrolünde transvers abdominis plane (TAP) blok etkinliğinin retrospektif olarak incelenmesi. *Uludağ Tıp Derg.* 2020;46(1): 31-37.
18. Motamed C. Clinical update on Patient-controlled analgesia for acute postoperative pain. *Pharmacy.* 2022;101:22.
19. Ueshima H, Hiroshi O. Incidence of lower-extremity muscle weakness after quadratus lumborum block. *J Clin Anesth.* 2018;44: 104.
20. Wikner M. Unexpected motor weakness following quadratus lumborum block for gynaecological laparoscopy. *Anaesthesia.* 2017; 72(2):230-232.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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